

UNITED STATES. CIRCUIT COURT. DISTRICT OF CONNECTICUT.

National Phonograph Company	)	In Equity.
	)	No. 1103 on
versus	)	Patent 713,209
American Graphophone Company	)	

DEFENDANT'S RECORD -- CAMERON DEPOSITION
March 16, 1904 - April 1, 1904

(Xerox copy from National Phonograph Co.
versus American Graphophone Co.; etc.
(West Virginia suits) p. 25-103 (Complainant's
Paper Exhibits))

the same are true and correct transcripts therefrom, and of the whole of said originals.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the Seal of said Court, at the City of New York, in the District and Circuit above named, this 12th day of March, in the year of our Lord one thousand nine hundred and nine, and of the Independence of the United States the one hundred and thirty-third. 10

(Signed) JOHN A. SHIELDS,
Clerk.

UNITED STATES CIRCUIT COURT,
SOUTHERN DISTRICT OF WEST VIRGINIA.

NATIONAL PHONOGRAPH COMPANY,	{	In Equity on Letters Patent No. 683,615.
<i>vs.</i> AMERICAN GRAPHOPHONE COMPANY.		

NATIONAL PHONOGRAPH COMPANY,	{	In Equity on Letters Patent No. 683,676.
<i>vs.</i> AMERICAN GRAPHOPHONE COMPANY.		

20

NEW JERSEY PATENT COMPANY,	{	In Equity on Letters Patent No. 831,668.
<i>vs.</i> AMERICAN GRAPHOPHONE COMPANY.		

"Complainants' Exhibit—Cameron Deposition in Connecticut Suit
on Edison Patent No. 713,209."

DISTRICT OF CONNECTICUT, } ss.
UNITED STATES OF AMERICA, }

I, R. F. CARROLL, Deputy Clerk of the Circuit Court of the United States for the District of Connecticut, do hereby certify that the annexed paper is a true copy of the original deposition of Shelton T. Cameron, in 30

NATIONAL PHONOGRAPH Co.	{	No. 1103 Equity
<i>vs.</i>		
AMERICAN GRAPHOPHONE Co.		

recorded and on file in said Court.

IN TESTIMONY WHEREOF, I have set hereto 40

my name officially and the Seal of said Court, at Hartford, in said District, this 6th day of May, A. D. 1909.

R. F. CARROLL, Deputy Clerk.

IN THE CIRCUIT COURT OF THE UNITED
STATES.
DISTRICT OF CONNECTICUT.

10	NATIONAL PHONOGRAPH CO.	}	In Equity. No. 1103.
	<i>Complainant,</i>		
	<i>vs.</i>		
	AMERICAN GRAPHOPHONE CO.		
			<i>Defendant.</i>

20 Testimony taken for final hearing on behalf of the defendant before Reeve Lewis, Esq., a Notary Public, at the offices of Philip Mauro, No. 620 F St., N. W., Washington, D. C., on this 16th day of March, 1904, by agreement of counsel.

Present: R. N. DYER, Esq., for complainant;
PHILIP MAURO, Esq., for defendant.

And thereupon, SHELTON T. CAMERON, being duly sworn, deposes and says a sfollows:

DIRECT EXAMINATION.

30 Counsel for defendant offers in evidence printed Patent Office copies of the specifications and drawings of the following U. S. Patents: Bell & Tainter, No. 341,214; Tainter, No. 341,287; Edison No. 382,417; Edison No. 393,462; Edison No. 400,647; Edison No. 406,576; Edison No. 484,582; Edison No. 488,191; Edison No. 667,662; Macdonald No. 559,806; Macdonald No. 606,725; Lioret No. 528,273; Appelt No. 303,970; Day No. 563,572.

Also a copy of British Patent to Young No. 1478 of 1894.

40 The foregoing patents are marked in evidence by

the titles given above preceded by the words "Defendant's Exhibit."

• Defendant also offers in evidence a certified copy of the file and contents of the patent in suit which is marked "Defendant's Exhibit, File and Contents of Patent in Suit."

Also the following exhibits which have been filed in suit No. 1076 between the same parties, to be known by the same titles as given them in that suit:

"Defendant's Exhibit, Macdonald's 1895 Mold."

"Defendant's Exhibit, Photograph of 1895 Mold."

"Defendant's Exhibit, Photograph of 1897 Mold No. 1."

"Defendant's Exhibit, Photograph of 1897 Mold No. 2."

"Defendant's Exhibit, Blank Mold."

Q. 1. What is your name, age, residence and occupation?

A. Shelton T. Cameron; age 46 years; Washington, D. C.; lawyer, making a specialty of patent causes, and mechanical expert.

Q. 2. Please state briefly what education and experience you have had which would qualify you to testify as an expert in patent causes, and particularly what experience, if any, you have had in the art of recording and reproducing sounds?

A. I was for many years an examiner in the U. S. Patent Office, where it was a part of my daily duty to examine applications for patents and report upon the patentability or non-patentability thereof. Since severing my connection with the Patent Office I have been continuously engaged in the practice of my profession, have prosecuted numerous applications for patents, made examinations and given opinions upon questions of patentability, infringement and identity of alleged infringing articles with patentable structures. I have also repeatedly visited workshops and manufacturing factories for the purpose of inspecting and study-

ing mechanical structures, and particularly have I familiarized myself with the patented and practical art of recording and reproducing sounds. I have made exhaustive studies of sound records, have familiarized myself with the actual commercial manufacture of talking machines and sound records, and have given a great many depositions and expert affidavits in causes pending before the U. S. Courts, wherein patents relating to the art of recording and reproducing sounds were in question. On the subject of the production of sound-records by forming them in a mold, I have lately given a deposition in a suit between the parties to the present suit, the earlier suit being upon Edison's Patent No. 667,662, dated February 5, 1901.

Q. 3. Have you read and do you understand the patent in suit, No. 713,209; if so, please state briefly what supposed invention or improvement is set forth in claims 2 and 3 thereof, comparing said claims with those of the earlier Edison Patent No. 667,662, referred to in your last preceding answer.

A. I have carefully read the specifications of Patent No. 713,209, in suit, and I understand it.

The patent relates to the production of sound-records (particularly cylindrical sound-records) by the use of a mold. In the making of the mold an original sound-record, cut or engraved in wax-like material, is used as the pattern from which the mold is made.

The specification states that the mold may be made "by any of the known processes—as for example, those indicated in my patent No. 484,582," which patent has been put in evidence by complainants and is referred to in the deposition of complainant's expert witness, Mr. F. L. Dyer. The making of the continuous cylindrical mold being old, the patent in suit relates only to the manner of using the old mold.

In the earlier patent, No. 484,582, it was pro-

posed to make the sound-records by "casting," that is, by melting the wax-like material and pouring it into the mold around a suitable core.

The leading thought in the patent in suit, distinguishing it as a departure from the 1892 patent No. 484,582 (as well as from the 1901 patent No. 667,662) is that the record is formed by introducing into the mold wax-like material in the form of a *solid* blank cylinder of a diameter (under normal temperature) to fit closely within the mold and by then expanding the blank cylinder so as to cause it to come into contact with (and to receive an impression from) the inner surface of the bore of the mold. This operation or procedure has been called for convenience a "pressing" operation, to distinguish it from a "casting" operation, such as described in the two prior Edison patents referred to above, and from a "dipping" operation as described in Patent No. 683,615 to Miller & Aylsworth, referred to in the deposition of complainant's witness, Miller (Complainant's Exhibit Miller & Aylsworth Method Patent No. 683,615).

The patent in suit appears to be based wholly upon the difference between *casting a molten material* into the mold, and introducing therein a *solid blank* which is *expanded* into close contact with the surface of the mold. This appears from the description of the invention in which the only departure from previous practice is in the formation of the record by the expansion of a solid blank within the mold. This is emphasized by the fact that the specification refers directly to Edison's prior patent of 1892, No. 484,582, wherein the formation of the record (when wax-like material was used) was by casting.

The description of the process of the patent in suit begins at the top of page 2 of the printed specification.

It deals solely with the manipulation of a solid

“blank,” and it is stated that this blank must have sufficient thickness to maintain its shape “during and after the act of disengagement from the matrix” (p. 2, ls. 12-14 and ls. 126-128). The word “blank” is used more than forty times in the specification, and the drawings indicate apparatus which could only be used with a *solid* blank. So far as the specification is concerned, the use of a liquid or molten material appears to be excluded from contemplation.

The expansion of the blank into intimate contact with the mold is effected by the application of heat either to the blank alone, or to both blank and mold (p. 2, ls. 18-27). To obtain the desired result the blank is preferably composed of a material having a higher coefficient of expansion than that of the mold, in which case it is said that the blank will come into contact with and receive an impression from the mold when both blank and mold are heated (ls. 33-40).

But the patentee prefers, “in order to facilitate the operation and make the resulting duplicate somewhat sharper,” to assist in the expansion of the blank by the forcible introduction of a tapering plug or mandrel (p. 2, l. 41, *et seq.*).

It is also stated that, with certain classes of material, “the entire expansion may be effected mechanically by forcing a tapering mandrel within the same,” *i. e.*, within the blank.

Whether the expansion be effected by heat, or by driving in a tapering plug, or by application of both these means, it is clear that they could be applied only to a *solid blank*. They could have no application to, and indeed are absolutely inconsistent with, the use of a molten material poured into the mold, which must receive the configuration of the internal surface of the mold by the congealing of the melted material in contact therewith.

Therefore, from the reading of the specification,

and from the fact that the prior patent referred to therein describes a casting operation, I understand that, by the patent in suit the patentee intended to disclose, and did disclose a procedure wherein the prominent and essential step consisted in *expanding a solid blank tablet within the mold*, until it received an impression therefrom.

The claims to which the question is directed read as follows:

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"2. The method of producing hollow cylindrical phonograms, which consists in obtaining a mold having a reverse phonogram-record on the inner wall of a cylindrical opening, forming a hollow cylindrical plastic phonogram within said mold, releasing the phonogram from the mold by a radial contraction of the phonogram sufficient to entirely clear the surfaces, and removing the phonogram from the mold by direct longitudinal movement.

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"3. The method of producing hollow cylindrical phonograms which consist in obtaining a mold having a reverse phonogram-record on the inner wall of a cylindrical opening, forming a hollow cylindrical plastic phonogram, within said mold, releasing the phonogram from the mold by a reduction in temperature sufficient to entirely clear the surface, and removing the phonogram from the mold by direct longitudinal movement."

Claim 2 sets forth a "method of producing hollow cylindrical phonograms," which method consists in (1) obtaining a suitable mold, (2) forming a hollow cylindrical plastic phonogram within said mold, (3) releasing the phonogram from the mold by a radial contraction of the phonogram sufficiently to entirely clear the surfaces, and (4) removing the phonogram from the mold by a direct longitudinal movement.

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In view of the prior art as exemplified by the patents here in evidence, it is evident that the "method" defined in this claim can be considered a

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departure from previous methods of molding cylinders of wax-like and other materials, if at all, solely in that part of the method which is defined by the words "forming a hollow cylindrical plastic phonogram within said mold." This conclusion is also reached by examination of the specification, which points out, as the salient feature of the invention, the expansion of the solid blank within the mold.

10 There is room for doubt and discussion as to just what meaning is to be given to the word "plastic" in these claims, inasmuch as that expression is not used in the specification. It is a relative and indefinite term, but taken in connection with the specification, it is to be given, in my opinion, a broad interpretation. A substance may be termed "plastic" if, in the particular operation in which it is used, it is capable of being impressed by a die or mold; although it might not ordinarily be termed
20 "plastic," as that term is usually employed in the arts. The wax-like material used in the talking-machine art would not ordinarily be termed "plastic," but when forcibly expanded against the surface of a mold would undoubtedly receive the impressions of such surfaces, and hence would be plastic for that purpose. I, therefore, understand the second step of the claim to mean bringing a solid *impressible* material (*i. e.*, a material capable of being *molded* by the means in contemplation),
30 into contact with the mold surface, as distinguished from bringing a liquid material into contact therewith and permitting the liquid to congeal. It is, to my mind, clear that this is the line which the patent draws between what is included in and what is excluded from it.

40 That I am correct in my understanding that the *invention* disclosed in the patent in suit is one limited to the expansion of a solid blank within the mold, is clearly shown by the act of the inventor

during the prosecution of the case in the Patent Office. By an amendment dated September 1st, 1898, and filed September 2nd, 1898, he erased several claims, among which was original claim 1, which was as follows:

"1. The process of duplicating cylindrical phonograms having a record thereon, which consists in forming a matrix or mold wherein the original record will be reproduced in relief, in loosely engaging the continuous cylindrical blank phonogram with the said matrix or mold, and in finally intimately engaging the blank phonogram with the said matrix or mold whereby the entire record will be impressed upon said blank phonogram simultaneously, substantially as set forth." 10

This claim is a fair sample of the other claims erased by the same amendment, and in explanation of the reasons why said claims were erased, applicant said:

"The claims which have been erased are canceled in view of the fact that they appear to cover processes which are broader than applicant's *invention*, namely, processes wherein the blank in the process of duplication is *displaced* instead of being *expanded*." (Italics mine.) 20

It thus appears that during the prosecution of the case in the Patent Office, the applicant considered that claim 1, which I have herein quoted, was broader than the *invention* disclosed in the specification, because it was broad enough to include the use of a solid blank which might be "displaced" to cause it to take the impression in the mold, whereas applicant's invention was *limited strictly to a process where a blank was "expanded."* The distinction which applicant made between "displacement" and "expansion" he pointed out to be that, in the case of "expansion," the blank was first enlarged and then subsequently contracted—like the expansion of a rubber band—whereas, in the case of "displacement," the blank was enlarged and after 30 40

leaving the mold it was larger than when it was originally inserted therein. It will be observed that this is a very fine distinction, and yet applicant regarded a claim which was broad enough to include both of these as being broader than his invention, and pointed out that his invention was limited to the expansion of a solid blank within the mold. Obviously, there is a greater difference between casting molten material into the mold, and expanding a solid blank within the mold, than there is between displacing a solid material within the mold which does not subsequently contract to its original size—and that of expanding a solid blank within the mold, which does subsequently contract to substantially its original size.

Claim 3 differs in no respect from claim 2, except in that it specifies that the contraction of the record is effected by a "reduction of temperature." This distinction is one of scope merely and in reality has no substance, since shrinking out the molten article by cooling it is the common practice in the molding art, and is the only means indicated in the patent in suit.

On comparing the procedure of these claims with that of Edison's prior patent No. 667,662, I find that the difference lies solely in the fact that the said prior patent describes the formation of the record by introducing *melted material* into the mold and allowing it to congeal. Thus, comparing claim 2 of the patent in suit with claim 4 of the prior Edison Patent No. 667,662, we find that they are identical excepting that where the earlier patent specifies "introducing a *molten* material in the mold to form a cylindrical duplicate and allowing the duplicate to set" (*i. e.*, congeal) the patent in suit specifies "forming a hollow cylindrical plastic phonogram within said mold."

This will be clearly seen by placing the steps of the compared claims in parallel columns.

PATENT IN SUIT, CLAIM 2.	PRIOR PATENT NO. 667,662, CLAIM 4.	
(1) Obtaining a mold, etc.	(1) Forming a cylindrical mold, etc.	
(2) Forming a hollow cylindrical plastic phonogram within said mold;	(2) Introducing a molten material in the mold to form a cylindrical duplicate, in allowing the duplicate to set.	10
(3) Releasing the phonogram from the mold by a radial contraction;	(3) Contracting the duplicate;	
(4) Removing the phonogram from the mold by direct longitudinal movement;	(4) Removing the contracted duplicate by a direct longitudinal movement.	

If the term "plastic phonogram" used in the claim of the patent in suit were taken to apply to and include the process of the earlier patent, there would be *no* distinction between the two patents (so far as affects the claims involved in this case) except one of scope. 20

Complainant's expert, Mr. Dyer, construes claims 2 and 3 of the patent in suit as broad enough to include an operation wherein the record is formed by casting a melted material. He, therefore, finds that claims 2 and 3 of the patent in suit differ from those of the earlier patent, No. 667,662, merely in that the claims of the patent in suit are broader in scope than those of the earlier patent. That is to say he gives it as his opinion that the words "forming a * * * plastic phonogram," embrace forming a phonogram by casting a molten wax into the mold, as in the two prior Edison patents to which I have referred. 30

The word "plastic" does not appear anywhere in the body of the specification, and we do not have, therefore, in the patent itself any clear definition 40

as to what meaning is to be attached to this word in claims 2 and 3. I have been unable, after careful reading of Mr. Dyer's deposition, to ascertain just what limitations he places upon the term "plastic," as used in these claims, but from study of his answers found on pages 67-68 in complainant's record, it is clear that he regards the term "plastic" as broad enough to include any material capable of receiving and retaining the configuration or outline of the record in relief on the interior of the mold; and it is equally clear that he regards the expression "forming * * * a plastic phonogram," as used in these claims, as being intended to include the act of melting and pouring into the mold any material which when it congeals will have been found to have received the configuration of the relief record existing on the interior surface of the mold. I cannot agree with this interpretation of the expression "forming * * * a plastic phonogram," since to thus construe the expression would be to give to claims 2 and 3 a meaning broader than the invention set forth in the body of the specification, when the same is viewed in the light of the prior art. As I have previously indicated, the invention set forth in the body of the specification, and the one to which all of the claims, except claims 2 and 3, are specifically limited, consists in inserting a body of solid material into the mold and expanding said body of solid material against the interior surface of the mold whereby the record on the interior of the mold is impressed into the surface of the solid body.

If the act of melting and pouring the material into the mold and allowing it to congeal, whereby it receives the configuration of the interior surface of the mold, is regarded as the equivalent in this art of expanding a solid body so as to cause it to receive the impression of the interior surface of the mold, then the invention defined in claims 2 and 3

of the patent in suit would be *the same invention* as that set out in Edison's prior patent No. 667,662, and claims 2 and 3 of the patent in suit would differ from claims 4 and 5 of the said prior patent only in scope. The invention defined in the two patents would be the same, though the breadth or scope of the claims mentioned would differ. For this reason, among others, I am clear that the expression "forming * * * a plastic phonogram within said mold," as this expression is used in claims 2 and 3 of the patent in suit, cannot be construed to include the act of pouring molten material into the mold and allowing said material to congeal. 10

In my opinion, the step or operation described by the words "forming a hollow cylindrical plastic phonogram" is broad enough to include any operation wherein a hollow blank in a solid state is expanded outwardly against the mold surface and receives the impress thereof, but not broad enough to include the operation of introducing a melted material into the mold and allowing it to congeal so as to receive the configuration of the relief record on the interior of the mold. 20

As a further indication that the formation of a sound-record by casting is not contemplated by these claims (2 and 3), any more than by the other claims and by the body of the specification, from all of which it is positively excluded, I call attention to the fact that in *casting* a sound-record, there is no point or stage in the procedure at which it can be said that a "plastic" sound-record is formed. In cooling down from the melted to the solid state the material of course passes through all intermediate degrees of plasticity; but it would require a great straining of what actually occurs to say that one step of the operation consists in forming a plastic phonogram. 30

For these reasons I conclude: 40

1. That claims 2 and 3 do not include the operation of casting a sound-record as set forth in claim 4 (and other claims) of Edison's prior patent No. 667,662.

10 2. That, if construed as including an operation wherein the record is formed by casting a molten material into the mold, the claims (2 and 3) of this patent in suit would be identical in substance with, and differ only in scope from, the claims (especially claim 4) of the said prior Edison patent. According to this interpretation, the claims (2 and 3) of the patent in suit, differ from claim 4 of the earlier patent simply in being broader or more generic in scope.

Q. 4. Please compare the procedure of claims 2 and 3 of the patent in suit with the prior Edison patent No. 484,582, of October 18, 1892, referred to therein.

20 A. The patent in suit says that the 1892 patent No. 484,582 describes a process of making a mold suitable for use in carrying out the method of the patent in suit (p. 1, paragraph beginning line 43). Since the patent in suit contemplates the use of a *continuous* cylindrical mold, I should understand from this reference that said 1892 patent describes a way of making a *continuous* cylindrical mold. Upon examination of said 1892 patent this understanding is found to be correct.

30 Therefore, up to the point of the *making* of the mold, the two patents are identical.

In the *use* of the mold, there is a difference in that the 1892 patent refers to pouring wax-like material into the mold, and also to pressing sheets of paper or tinfoil against the surface of the mold by means of a plunger or otherwise, and backing up these sheets by wax, cement or the like. The patent in suit describes the different operation of expanding a solid *tubular* blank within the mold.

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This blank must be thick enough to maintain its shape during and after engagement from the mold (p. 2, lines 11-14). This limitation was evidently introduced to distinguish from the use of thin pliable sheets of material such as paper or tinfoil. Thus the patent in suit specifically demands not only a tubular blank in a *solid* state, but one having a certain thickness and rigidity. This is what distinguishes the method of the patent in suit from that of the 1892 patent. 10

In the 1892 patent, the patentee proposed going somewhat further than in the patent in suit. He evidently thought he could facilitate removal of the record from the mold, and possibly save the time which is required for a melted material to cool and contract sufficiently for removal from a cylindrical mold, by resorting to the common expedient of dividing the mold longitudinally into sections. Such a mold can be opened to deliver the cast article, and the mold immediately re-used. This suggestion, however, was not well considered, and it would seem that, in making it, Mr. Edison did not take into account the effect of the lines of division between the sections of the mold in forming minute fins upon the surface of the molded record. These minute fins would produce sharp noises, as of percussions, and impair the success of reproduction of the recorded sounds. Complainant's expert points this out, saying (p. 21): 20 30

"it is *obvious* that, however carefully the joints between the sections might be made, it would be impossible to prevent the formation of a minute fin or burr on the duplicates at each joint, which would destroy their commercial character." (Italics mine.)

I concur in this statement, and hence it is "obvious" that the methods of the 1892 patent, the claims of which include the use of a continuous 40

mold as well as of a split mold, could only be carried out to a satisfactory result by means of a continuous mold, which, of course, involves permitting the cast record to remain in the mold until it has cooled and contracted sufficiently to admit of withdrawal longitudinally.

Adjourned to Thursday, March 17, 1904, at 10:30 A. M.

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March 17, 1904, 10:30 A. M.

Met pursuant to adjournment.

Parties as before.

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(Answer continued.) I therefore find, upon comparing claims 2 and 3 of the patent in suit with the prior patent No. 484,582, that the only difference between the procedure of said claims and what is disclosed in said prior patent is in the forming of the record by expansion of a solid blank of material sufficiently plastic (*i. e.*, impressible) to take the impress of the surface of the mold, instead of casting a molten material.

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Q. 5. Assuming that claims 2 and 3 of the patent in suit are, as complainant's expert says, not limited to forming the sound-record by expanding a solid blank, but include casting a record therein, do you or not find any substantial difference between such claims and the prior 1892 patent?

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A. Making the assumption stated in the question, there is no substantial difference between the procedure of claims 2 and 3 and that disclosed in the 1892 patent. The claims are for a "method," *i. e.*, for a definite mode of procedure whereby a mass of material (such as wax) in the form of a hollow cylinder receives upon its surface the impression from a mold of an undulatory line representing sound-waves. The 1892 patent specifies

making a "hollow" cylindrical record because it describes pouring the material, "such as wax or wax-like material" into the mold and "preferably around a suitable core." If the method of the patent in suit is assumed to be the same in this respect (*i. e.*, in introducing a molten material into the mold) as that of the 1892 patent, we must seek a difference, if any, in a later stage of the process. While the 1892 patent describes removing the record by opening the mold (which is to be made in sections for that purpose) I do not consider that it required any additional disclosure to enable a person skilled in the art to use the mold in its original continuous condition. In other words, the 1892 patent describes the making of a *continuous* cylindrical mold. It does not describe the manner of using such mold, because the use of such molds was well understood in the art of casting plastic materials, and even in this talking-machine art (see defendant's exhibit, Appelt patent No. 303,970, and Edison Patent No. 382,417. The 1892 patent then goes a step farther, proposing that the mold be divided into sections so that it could be opened. We have, therefore, in this 1892 patent a cylindrical mold in each of its two known forms, *i. e.*, continuous and sectional, the use of each being well known. In my opinion it did not require a further invention or disclosure after the 1892 patent to retrace the step which carried Mr. Edison from the use of the continuous mold to the sectional mold. This was not a step forward, but a step backward—merely retracing a step which Mr. Edison found carried him away from the path of practical success.

My conclusion in this regard is absolutely confirmed by evidence in this case on behalf of complainant.

To put the matter another way, the question whether a substantial difference is here presented depends upon what was, prior to the patent in suit,

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within the knowledge and skill of persons familiar with the art of molding, and upon what would or would not be obvious to persons skilled in that art. I quite agree with complainant's expert, Mr. Dyer, in his statement that it is obvious that the split mold of the 1892 patent could not be successfully employed; and I think it is equally obvious to one skilled in the art that the material could be cast in the continuous mold disclosed by the 1892 patent, and then withdrawn longitudinally.

I give it as my opinion, and think there can be no doubt about it, that to give a skilled workman the continuous cylindrical mold described in patent No. 484,582, and shown in Fig. 4 thereof, and also the "wax-like material" mentioned in the patent, and to tell him to cast said material therein, would put him in possession of all the directions necessary. He would know, and indeed it is obvious to all persons having ordinary intelligence and information, that the melted material must be allowed to remain in the mold until released "from the mold by a reduction in temperature sufficient to entirely clear the surfaces" (as specified in claim 3 of the patent in suit), after which the record would be removed "by a direct longitudinal movement."

If I have not overstated what would lie within the knowledge of persons skilled in this art, it is clear that everything which claims 2 and 3 of the patent in suit set forth subsequent to the step of forming the phonogram, follows inevitably from the use of a continuous cylindrical mold, and can not possibly be regarded as embracing any novelty at the time of the grant of the Edison 1892 patent No. 484,582.

I further give it as my opinion that it would, in 1892, be obvious to persons skilled in the art, that the suggestion of splitting the mold would be disadvantageous; but if anyone were not bright

enough to see this without experiment, he would immediately discover it and do as Mr. Edison did four years before he issued this patent, namely, discard this suggestion as disadvantageous and use the mold in its original continuous condition.

I find then that the 1892 patent disclosed a practical way of making a continuous sound-record mold (the use of which was well understood), and also contained a disadvantageous suggestion; but I am of opinion that the disadvantageous character of this suggestion was obvious at the date of said patent, or at least so readily ascertainable as not to mislead.

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In this opinion I am absolutely confirmed by the evidence given herein on behalf of the complainant.

In the passage which I have quoted above from Mr. Dyer's deposition, he asserts that:

"It is *obvious* that, however carefully the joints between the sections might be made, it would be *impossible* to prevent the formation of a minute fin or burr."

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He says again (p. 21) that:

"Success can *only* be obtained when the matrix or mold is *continuous* and where the duplicates are removed by shrinking them radially."

Again he says in answer to x-Q. 13 (p. 31), assuming the mold to be formed from a record having a shallow-cut groove, that:

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"It is *absolutely incredible to me that any one should use a sectional mold*, because as I point out in my direct examination, the joint between the mold sections *must inevitably* produce a minute fin on the duplicate corresponding to each joint."

He goes on to say that it would be "*just as foolish*" to use a sectional mold as it would be to deface

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a continuous mold by longitudinal scores or creases.

10 While I would not go so far as to say that Mr. Edison had, in suggesting in his 1892 patent that the mold might be split, made a suggestion so absurd and foolish as Mr. Dyer seems to think, it is unquestionably a fact that anyone following this suggestion would instantly find its result unsatisfactory (as Mr. Edison did) and would hence revert (as he did) to the continuous mold. Indeed, I find this to have been precisely Mr. Edison's experience. He says that in the year 1888 he employed the continuous mold and the method of shrinking the record out, and that thereafter he always used that method of getting the record out of the mold, no matter how the record was formed (I refer to Mr. Edison's answers to questions 15, 16 and 17 on page 208 of complainant's record).

20 It thus appears that for four years before the 1892 patent issued, and for four years before the application therefor was renewed (which was on March 30, 1892) the expedient of splitting the mold had been discarded entirely by Mr. Edison. It follows that the only satisfactory way in which the claims of the 1892 patent could be carried out was by the use of a continuous mold. I quote claim 4 of that patent:

30 "4. The process of duplicating phonograms carrying a phonographic record, consisting, first, in indenting the original record upon a phonogram; second, constructing a matrix or mold of such original record by depositing thereon a coating of metal by vaporizing metal in a vacuum in which the record is placed, and, third, producing duplicate phonograms from such matrix, substantially as set forth."

40 Since it was, as Mr. Dyer says, "obvious" that the expedient of splitting the mold could not be used with satisfactory results, it of necessity follows that what this 1892 patent disclosed at the

time of its issue to all persons sufficiently well informed in the art, or sufficiently intelligent to take notice of what is "obvious," was a method of making duplicate sound-records by means of a continuous cylindrical mold made by the vacuous-deposit method, the material being melted and poured into the mold, and allowed to cool therein until sufficiently contracted to admit of longitudinal withdrawal.

The 1892 patent, therefore, discloses fully the procedure of claims 2 and 3 of the patent in suit if we interpret those claims to mean casting a sound-record therein, and as not limited to expanding a solid blank.

If, instead of considering what was obvious, we consider what had been actually *proposed and done* in this art in casting sound-record cylinders in continuous cylindrical molds, using the very materials proposed in the 1892 patent (*i. e.*, "wax or wax-like material") and shrinking the cylinder by a reduction of temperature clear of the mold, we reach the same conclusion as to the extent of the disclosure of the 1892 patent.

Q. 6. Please compare the methods of claims 2 and 3 with the method of making blank cylinders or tablets for sound-records, referring in particular to Edison's Patent No. 382,417, May 8, 1888.

A. In making blank cylinders or "phonograms" it has long been customary to cast the wax-like material in continuous cylindrical molds, and after congealing and sufficient contraction of the cylinder, removing it from the mold by a direct longitudinal movement. Such method is identical with that of claims 2 and 3, unless we limit those claims to a method of expanding or pressing the cylinder against the surface of the mold.

In making this statement I do not ignore the fact that the claims specify the use of molds having a surface impression of a sound-record; but it is

obvious that the nature of the surface of the mold is not a part of the method of using the mold.

10 In making blanks it is customary, after the casting operation, to improve the finish of the surface as by turning or shaving. Hence, in the ordinary manufacture of blanks no particular care is exercised in withdrawing the casting from the mold to prevent marring its surface. I refer to this, because Mr. Dyer seems to think that the process of casting a sound-record is different from that of casting a blank in that the latter is withdrawn from the mold forcibly and without exercise of any particular care, and is subsequently shaved or polished. To my mind, nothing that is done or omitted after the casting operation is completed, can change the fact that blanks are, and long have been, made by casting in a continuous cylindrical mold, allowing them to contract radially, and then withdrawing them lengthwise. Nor does a variation of the *degree* of cooling and shrinkage allowed to take place in the mold change the nature of the process.

20 The Edison patent, referred to in your question, No. 382,417, May 8, 1888, shows that the forcible or violent removal of the blank from its mold is not always contemplated, and that it would not be a novelty or an inventive act to allow the blank to remain and contract in the mold.

30 The patent describes specifically the making of a blank cylinder in a cylindrical mold, and finishing it in another mold. For the first part of the operation (casting the blank) it is proposed to use a two-part mold; but it is said that the mold may be of "any other suitable construction." The description of the procedure is as follows:

40 "E is the tapering core of the mold. The mold is swung to the left over the solid part of the base, and the core being placed in it and the mold closed, hot wax is poured into the mold, forming a cylinder around the core E.

When the wax is partially cool, sufficiently so to retain its shape, the mold is swung to the right over the opening D and the core E is pushed down into the opening D, as shown in Fig. 2, thus permitting the wax to contract without breaking. After the cylindrical blank has cooled down to a temperature where it is still slightly plastic—say 100 degrees Fahrenheit—it is removed from the mold and is placed in the die F. This die may be a divided die or one that is solid. It has a cylindrical opening with a shoulder *a*, at its lower end. A tapering plunger, G, pressed forward by a screw, H, is forced into the bore of the phonogram blank, pressing the blank against the walls of the surrounding die, and giving it the exact shape and size both externally and internally that it is desired the blank should have. The die and its plunger are made of highly polished metal. Speculum metal is preferably used for this purpose. The plunger is then removed from the blank and the blank removed from the die, when it will be ready for use on a phonograph.”

Since continuous molds for use in casting blanks were known, it would not require invention to substitute a continuous mold for a divided mold in the first part of the process; and even without such substitution, the process is the same as when a continuous mold is used, for the wax cools down from the melting temperature (say about 250 degrees F.) to 100 degrees F. *while in the mold*. The shrinkage accompanying such reduction of temperature is far greater than what is required to clear a molded record from its mold. Therefore, I find in the first operation of Patent No. 382,417, a complete disclosure of the process set forth in claims 2 and 3 of the patent in suit, when those claims are construed as broad enough to cover the operation of casting a sound-record.

In considering the second part of the operation described in this Edison Patent No. 382,417, namely, that carried on by the die F (which is really

another mold), it is not necessary to *assume* the use of a solid or continuous mold or die, as the patent expressly says that "this die may be a divided die or one that is solid." This statement demonstrates the recognized equivalency, even at that early day in the art, of continuous and divided molds.

10 Having then a continuous mold (or die), we are told by the patent to insert in it a wax cylinder at "*a temperature* where it is still *slightly plastic*—say 100 degrees Fahrenheit" (ls. 62-63), and to expand it against the surface of the mold by forcing into it a tapering plunger, so that it will take the exact shape of the mold. It is obvious that the removal of the wax-like cylinder, thus molded, is and can only be effected by allowing it to cool and contract, and then withdrawing it longitudinally.

20 The operation thus described to be carried out by means of the mold or die, is a true molding operation of the specific sort known as "pressing," and is, in my opinion, in every respect substantially the same as that set forth in claims 2 and 3 of the patent in suit. This statement holds good notwithstanding that, in the 1888 patent, the surface of the mold or die is a smooth, highly polished surface, whereas in the patent in suit a part of the surface of the mold or die is covered with exceedingly fine lines. The question relates simply to
30 *method*, and it is quite clear that we have, in the two cases considered, identically the same method; that is to say, in each case a tube of wax-like material is introduced into a continuous cylindrical mold, is expanded forcibly against the inner surface of the mold, and is contracted and withdrawn lengthwise. In each case the *result* is the same, namely, the surface of the wax-like cylinder is caused to take perfectly the impression of the surface of the mold.

40 Identity of method and result is thus beyond

question; and I think it accurate to say that the *instrumentalities* employed in the two cases are also identical in substance. These instrumentalities are a continuous mold and a tapering plunger. The mold does not become a different apparatus when part (or all) of its surface is covered by a pattern. Even a sound-record mold has a portion of its surface smooth and highly polished. Considered as an apparatus, it is clear that the part which is smooth and polished acts exactly as the part which has the shallow sound-record grooves, the action being to form the impress of the surface upon the substance treated. 10

I, therefore, conclude that the Edison 1888 patent No. 382,417 discloses the method set forth in claims 2 and 3 of the patent in suit.

Q. 7. Please compare claims 2 and 3 of the patent in suit with the U. S. patent to Lioret No. 528,273 and British patent to Young No. 1478 of 1894. 20

A. I will first refer to the Lioret patent. The only part which is pertinent is that which relates to molding cylindrical records. That this part of the patent is very pertinent to claims 2 and 3 of the patent in suit will appear by reading claim 3 of the Lioret patent, which is as follows:

"3. The method of reproducing phonographic cylinders which consists in first obtaining a metal mold by electro-deposit upon an original phonographic cylinder, next placing bodily within the so obtained mold a solid ring of plastic material capable of being softened by heat, next softening this ring by heat, and finally so distending the said ring within said mold by internal pressure that it will receive therefrom an impression corresponding with that of the original cylinder, substantially as herein described." 30

To my mind, this language is a full disclosure of the broad claims 2 and 3 of the patent in suit, it 40

being assumed (as must be the case) that the record is shrunk loose from the mold. It is not, however, necessary to make this assumption, since the specification (p. 2, l. 106) describes contracting the record and freeing it from the mold by plunging it into cold water.

10 There are specific differences between Lioret's procedure as a whole and that of Edison as a whole, but such differences do not affect the comparison which you have asked me to make, because they are not included in claims 2 and 3 of the patent in suit, particularly if we give them the broad construction
20 contended for by Mr. Dyer. We have, in claim 3 of the Lioret patent, a clear statement of a process consisting broadly of the following steps: (1) forming a continuous metal mold by electro-deposit upon an original phonographic cylinder; (2) placing within the mold a solid ring of plastic material; (3) heating and expanding the ring until it receives the impression of the mold; (4) cooling
and contracting the record.

We see that Lioret not only specifies expanding a ring of *plastic* material, but one of the very materials (celluloid) which Edison mentions as suitable for practicing his method.

It is clear that, whatever differences there may be between Edison's method and that of Lioret, they are not such as affect claims 2 and 3 of the
30 patent in suit, the subject matter of which is fully disclosed in the Lioret patent.

The specific differences are these: Lioret makes his original sound-record on the apex of a V-shaped ridge, and consequently the surface of the mold will present a corresponding departure from the usual configuration of a sound-record mold. In consequence of this departure from the usual form of a sound-record, it becomes necessary, when the molded record is shrunk loose from the mold, to
40 turn the latter with a screwing movement in with-

drawing it. The movement given to the record in withdrawing it from the mold is not, in my opinion, a part of the process of making the record; and in any event involves merely the exercise of the most ordinary judgment.

I quote the description given in the Lioret patent of the method of molding:

“To produce the cylinders of celluloid, I operate as follows: I prepare the matrix cylinder *a* (Fig. 4) as I have hereinbefore described. Then I take upon it, as is shown in Fig. 5, a galvano-plastic mold *a1*, which presents consequently the form of a tube having in its internal surface the counterpart of the threading and the impressions of the matrix cylinder *a*. (See Fig. 6.) I remove this tube from the matrix cylinder by first heating it externally to expand it sufficiently to enable it to be unscrewed from the said cylinder, the impression being so slight that very little expansion is necessary. After its removal I introduce into the said tube a sleeve or ring *c* of celluloid (see Fig. 7) just large enough to enter it freely, then plunge the whole into hot water. The celluloid is thus softened, and I then introduce forcibly into the said collar or ring *c* a mandrel *a2* sufficiently large to dilate the said ring or collar and cause it to penetrate into all the cavities of the mold *a*, as shown in Fig. 8. I then plunge the whole into cold water and the celluloid recovers its hardness and is at the same time generally contracted sufficiently to permit the easy withdrawal of the ring *c* from the mold *a* by unscrewing it therefrom. If, however, the contraction of the ring *c* in this way is not sufficiently greater than that of the mold *a*, the mold may be slightly warmed by heat externally applied.

“It may be here mentioned that the impression produced by the style on the matrix cylinder *a* reproduced in reverse in the mold *a* is so slight that only a very slight dilation of the ring *c* is necessary to obtain the impression on it and a very slight contraction to permit it

to be unscrewed from the mold *a* without damaging said impression.

"It may be further mentioned that the threads of the matrix are very fine in practice and are very much exaggerated in the drawings to facilitate the illustration. This ring *c* thus becomes finally a reproduction cylinder which is an exact reconstitution of the matrix cylinder *a*. This method is rapid and economical and gives perfect results."

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Inasmuch as the specific points of difference between the procedure of Lioret and that of the Edison patent in suit is brought about by a departure which Lioret proposes from the use of the ordinary smooth-surfaced record cylinder, that difference does not confer novelty upon the Edison procedure, which, in this respect, simply adheres to the ordinary practice.

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Adjourned to Friday, March 18, 1904, at 10:30 A. M.

March 18, 1904.

Met pursuant to adjournment.

Parties as before.

(Mr. Cameron continues his answer to Q. 7.)

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The Young British patent No. 1478 of 1894, mentioned in your question, distinguishes from the method described by Lioret (who had earlier English and French patents) in certain minor details. Beginning at line 31, page 1, of the Provisional Specification, Young describes making a cylindrical mold by coating a wax master record with plumbago, electroplating a metallic shell thereon and backing up this shell with a metallic body. This is

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the method whereby defendant makes its mold. Con-

tinuing (lines 12-22, page 2) Young describes molding a duplicate by warming the mold made as above stated, and introducing into it a thin hollow cylinder of "any suitable material *capable of being rendered plastic* by application of a gentle heat," and "pressing" the same against the surface of the mold, taking "an exact impression therefrom," after which the plastic cylinder is allowed to cool and is then withdrawn from the matrix or mold by a direct longitudinal movement. The description of Young's method given in his Complete Specification is substantially the same as that found in the Provisional Specification. 10

It will be observed that Young obtains his mold or matrix by coating the original record with plum-bago and then electroplating the same, as it is stated in the patent in suit (page 1, ls. 69-72), may be done. Moreover, his manner of removing the original record from the electroplate is identical with one of the ways suggested in the patent (p. 1, ls. 91. 92), viz., by melting it out; furthermore, the thin electroplate thus obtained is backed up by an enclosing cylindrical jacket to give it the proper rigidity or "stability." Up to this point the method described by the Young British patent is in exact accord with the method described in the patent in suit, though the preferred method indicated by the patent in suit of obtaining the conducting coating for effecting the electro-deposit on the record is by the "vacuous" method described in Edison's earlier patent No. 484,532. This British patent, therefore, discloses the precise method of obtaining the mold of the patent in suit, unless we regard said method as limited to the vacuous deposit method of Edison's earlier patent. 20 30

Having thus obtained his matrix, Young introduces thereinto a thin hollow cylinder or blank of such diameter as to just fit within the mold, the matrix or mold having been previously heated or 40

warmed. In defining the material of which this blank cylinder is composed, Young specifies that it "may be of any suitable material capable of being rendered plastic by the application of a gentle heat," and he specifically mentions celluloid and vulcanite as examples of such materials. Any expert in the art, however, would recognize the ordinary phonogram blanks made of wax-like material, such as metallic soaps or mixtures of saponified stearic acid and ceresin, as coming within the description which Young gives of a suitable material. That is, it was recognized at that time by everyone skilled in the art, that such tablets were "capable of being rendered plastic by the application of a gentle heat." It is therefore apparent that, while Young specifically mentions celluloid and vulcanite, it was clearly within the skill of the mechanic to substitute a blank made of wax or wax-like material for Young's blank of celluloid or vulcanite, because such blanks were, for the purposes of Young's invention, recognized equivalents in the art. That I am not mistaken in regarding the wax-like metallic soap blanks as the equivalents of the celluloid and vulcanite blanks of Young is clearly demonstrated by the fact that the patent in suit mentions polished ebonite, vulcanized hard rubber and celluloid as equivalent substitutes for a blank composed of stearic acid, which is the principal ingredient of the wax-like cylinders mentioned, and, furthermore, mentions these materials (ebonite, hard rubber and celluloid) together with "waxes." It therefore appears that, for the purposes of the patent in suit, it is a matter of indifference whether celluloid, vulcanite—which is but another name for ebonite or vulcanized hard rubber—or the wax-like blank, be employed.

Up to this point, then, the steps of the patent in suit are identical with those of the Young patent. The blank having been introduced within the mold,

Young then proceeds to render the same capable of receiving the impressions of the mold by the application of heat, which, he says, "may be that given off from the heated electro and its casing." The blank having been sufficiently softened by the application of heat, Young then proceeds to "press the same gently and evenly up to and against the face of the electro and take an exact impression therefrom." The Young patent does not state any particular way, nor does it describe any particular apparatus to be employed in thus pressing the hollow cylindrical blank against the interior surface of the mold. This, however, was entirely unnecessary, in view of the fact that it was well known in the art—see Lioret patent above and Edison's U. S. Patent No. 382,417, of May 8, 1888—that a hollow cylindrical plastic phonogram, when warmed, could be pressed outward against the surface of a continuous mold by introducing a mandrel into the hollow blank. It will also be apparent that the heating of the hollow blank introduced by Young would also cause it to expand into contact with the mold, and that the use of the mandrel would only be necessary to obtain a sharper impression. We have, therefore, disclosed in the Young British patent the precise method of taking the impression that is described in the patent in suit, viz., heating the hollow blank while within the mold and then pressing it outward, *i. e.*, expanding it against the interior surface of the mold.

There would thus be formed "a hollow cylindrical plastic phonogram within said mold." This having been accomplished, Young then proceeds to reduce the temperature of the plastic phonogram thus formed, *i. e.*, he cools it. This would result in "releasing the phonogram from the mold by a radial contraction of the phonogram sufficient to entirely clear the surfaces," provided the cooling were carried to a sufficient degree. Young states, however,

that he employs a very thin blank, and after cooling it he slightly collapses it and then readily withdraws it from the mold. Inasmuch, however, as the specific substance mentioned by Young, viz., celluloid, is one of the identical substances mentioned in the patent in suit as suitable for carrying out the process, and, moreover, is the only substance specifically claimed in the patent in suit (see claim 18), it must be apparent to anyone skilled in the art that if cooling a celluloid phonogram when practiced by Mr. Edison would result in sufficient contraction of the phonogram to cause it to entirely clear the surfaces of the mold, then cooling a phonogram made of the same material (celluloid) in the same kind of a mold would result in the same contraction when practiced by Mr. Young. Certainly, if one skilled in the art undertook to practice the method disclosed in the Young patent, and after obtaining the impression of the mold upon the warm plastic cylinder, should then proceed to cool it—as Young directs—he would inevitably find that his duplicate phonogram would be contracted sufficiently to clear the surfaces of the mold and permit him to withdraw it by a direct longitudinal movement. I do not regard Young's suggestion that he can remove a very thin cylinder from the mold by cooling and then slightly collapsing it as constituting a substantial difference between his method and that defined in the Edison patent in suit, since anyone skilled in this art would at once perceive that when he cooled the phonogram its contraction would be sufficient to permit its ready removal from the mold without the slight collapsing action mentioned in the Young patent.

Claims 2 and 3 of the patent in suit, in my opinion, are necessarily limited by the disclosure in the specification and the prior art to the method of forming the hollow, cylindrical plastic phonogram within the mold by expanding a solid body placed

within the mold so as to obtain an impression of the relief record therein. But whether we regard these claims as thus limited or not, they are, in my opinion, anticipated by the method disclosed in the Young patent.

The claims in question define a method which consists in obtaining a mold having a reverse phonogram record on the inner wall of the cylindrical opening, and Young does this; the forming a cylindrical plastic phonogram within said mold, which Young also does; then releasing the phonogram from the mold by radial contraction due to cooling of the phonogram, and Young cools his phonogram. Up to this point the steps are the same, using the same apparatus and the same material, and the result must necessarily be the same, *i. e.*, a phonogram contracted sufficiently to entirely clear the surface of the mold and permit it to be removed therefrom by direct longitudinal movement.

During the prosecution of his application in the Patent Office, Edison presented the following claims:

"1. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in forming a matrix or mold wherein the original record will be reproduced in relief, in loosely engaging the continuous cylindrical blank phonogram with said matrix or mold, and in finally intimately engaging the blank phonogram with the said matrix or mold whereby the entire record will be impressed upon said blank phonogram simultaneously, substantially as set forth.

"5. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal upon the original phonogram so as to form a cylindrical matrix or mold, in inserting the continuous cylindrical blank to be reproduced within said matrix or mold, and finally in intimately engaging the blank with the record

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in relief carried by the bore of said matrix or mold, whereby the record will be simultaneously reproduced on said blank, substantially as set forth.

10 “6. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal upon the original phonogram so as to form a cylindrical matrix or mold, in inserting the continuous cylindrical blank to be reproduced within said matrix or mold, and in finally expanding the blank into intimate engagement with the record in relief carried by the bore of said matrix or mold, substantially as set forth.

20 “12. The method of making hollow phonograms which consists in securing a hollow metallic shell with the reverse record therein, inserting an expansible blank in said shell and then heating both, expanding the blank by forcing a tapering plunger therein, withdrawing the phonogram, substantially as set forth.”

30 These claims are found on pages 6 and 7 of the original specification and in the amendment of May 26, 1898, filed May 27, 1898, as will be found from an inspection of the certified copy of the file-wrapper and contents of the patent in suit, in evidence herein. These claims were rejected on the British Lioret patent and also on the British patent to Young No. 1478 of 1894, above mentioned. Subsequently, by an amendment filed September 1, 1898, Mr. Edison erased these claims, giving as a reason therefor that “they appear to cover processes which are broader than applicant’s *invention*, namely, processes wherein the blank in the process of duplication is displaced instead of being expanded.” It will be observed that each of these claims is limited to the employment of a blank inserted within the mold, which blank is subsequently caused to intimately engage the matrix or mold, claims 6 and 12 specifying that this is brought about by expanding the blank, and claim 12 even going so far as to

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specify that this expansion is brought about by introducing a tapering plunger within the blank and then further specifying that the phonogram thus formed is cooled and then withdrawn. Bearing in mind that Young and Edison employ the same material for their blanks (celluloid), it is perfectly clear that if Young secured a displacement of his material in practicing his process, then Edison must also have displaced the material of his blank, since he practiced the same process.

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If we compare claim 12, quoted above, which was erased by Mr. Edison in the prosecution of this case, with claims 2 and 3 of the patent in suit, we find that said claim 12 certainly defines the making of a hollow metallic shell with a reverse record therein, the forming of a hollow cylindrical plastic phonogram within said shell or mold (this being done by inserting an expansible blank in said shell, heating and expanding the blank), reducing the temperature and then withdrawing the phonogram. And yet this, Mr. Edison says, is broader than his invention. We must, then, look for a definition of Mr. Edison's invention (if the same is included at all in claims 2 and 3 of the patent in suit), in that portion of step three of the claims which specifies that the reduction of temperature of contraction is "sufficient to entirely clear the surfaces" and in that limitation of step four which defines the removal of the phonogram as being secured by a "direct longitudinal movement." As I have heretofore pointed out, it had been known long prior to the date of the patent in suit that the contraction of the wax-like material theretofore commonly employed in the manufacture of blanks and records, was very great, being sufficient to not only entirely clear the surfaces of the mold, but to do this with a large margin to spare. For instance, Mr. Edison stated during the prosecution of the application that a contraction of .005 of an inch would be suf-

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10 ficient for this purpose, and it was well known, long prior to the date of the patent in suit, that the contraction of the material greatly exceeded this amount. Such being the case, it would be obvious to anyone versed in the art that if he cooled a cylinder of wax-like material which had been previously heated and expanded within Young's matrix, it would contract sufficiently to clear the surfaces of the mold, and thereby permit it to be removed from the mold by a direct longitudinal movement.

 There is another view to take of claims 2 and 3 of the patent in suit in connection with the Lioret and Young patents which will also lead to the conclusion that there is nothing novel defined in said claims.

20 If one skilled in the art had before him the disclosure of the Lioret patent and undertook to make a duplicate record by said patent, he would employ a matrix or mold slightly different in character from that disclosed in the patent in suit and employed by the defendant herein, though as I have heretofore pointed out, I do not regard this difference in the mold as one having any practical bearing or effect upon the character of the *method* practiced, the steps of the operation of forming a duplicate not being in any way altered by the use of this slightly different mold. As is pointed out in the
30 Lioret patent, the record employed to illustrate Lioret's invention is one having the undulations corresponding to sound waves impressed upon the apices of screw-threads previously cut upon a cylinder.

 The record from which Young makes his matrix, however, is one of the ordinary records cut or engraved upon a wax cylinder, which record is electroplated precisely in the manner described in the patent in suit and employed by defendant herein. It
40 appears, therefore, that at the date of the patent in

suit both forms of record were well-known in the art, as were also electroplated matrices made from both records. If, then, a workman skilled in the art, should undertake to make a duplicate record according to the process disclosed in the Lioret patent, but instead of using Lioret's record formed on the apex of a screw-thread and the corresponding matrix or mold, he should substitute the matrix or mold of the Young British patent, he would be merely substituting one old and well-known form of apparatus for another equally old and well-known form. He would be merely doing what the skilled workman in the art is expected to do, viz., make a selection of such tools or forms of apparatus as he might deem best calculated to accomplish the particular end which he had in view.

Assuming that a skilled workman in practicing the method of the Lioret patent substitutes a Young matrix or mold for the one mentioned by Lioret, and then proceeds without any other departure whatever from the exact disclosure of the Lioret patent, he would practice the identical method set forth in the patent in suit; that is, he would obtain a mold having a reverse phonogram record on the inner wall of a cylindrical opening, which mold would be the identical mold used by defendant herein and described in the patent in suit; he would then insert within said mold a hollow blank composed of a material (celluloid) capable of being rendered plastic by the application of heat, and this material is the same material specifically mentioned and claimed in the patent in suit (see claim 18); he would then insert a tapering plunger within the plastic blank and expand it outward against the walls of the cylindrical mold, after which he would withdraw the plunger and cool the duplicate phonogram. At this point the phonogram would be sufficiently contracted to clear the surface of the mold so that it could be readily withdrawn by a direct

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longitudinal movement, and it would not be necessary to resort to the unscrewing movement which occurs when the form of record and matrix used by Lioret is employed.

10 In other words, if we substitute for the Lioret matrix another old and well-known matrix (that of Young), as any skilled workman might do without making an invention, and proceed to follow step by step the process of the Lioret patent, we would necessarily practice step by step identically the same process described in the patent in suit; we should use the same form of matrix or mold; we should use the same material; we should render this material plastic and expand it in identically the same way (by heat and by plunger) : and we should contract it in the same way (by cooling) ; and since the material and apparatus employed and the steps pursued are identical up to this point, we should
20 get identically the same result, viz., a duplicate record so contracted radially as to clear the surface of the mold and permit its withdrawal from the mold by a direct longitudinal movement; that is, we should practice absolutely the method disclosed in claims 2 and 3 of the patent in suit, as well as many of the other claims.

30 For the reasons stated, I am clearly of the opinion that claims 2 and 3 of the patent in suit define nothing novel over the disclosures of the Lioret and Young patents mentioned in this answer.

Q. 8. What, in general, was the nature of the material used at the date of the Edison 1892 split-mold patent No. 484,582, and what was its capacity for shrinking under changes of temperature?

A. The material most commonly employed at and prior to the date of the Edison 1892 split-mold patent, referred to in your question, was of a wax-like character and generally composed of a mixture of waxes or materials, such as saponified stearic
40 acid, which is of a very hard nature, tempered with

waxes such as ceresin. All of said materials, whatever their specific composition, were more or less plastic in character. That is, they were capable of receiving and retaining an impression from a mold, though when cooled to ordinary temperatures the ordinary sound-record materials were somewhat brittle in character and liable to be shattered in falling from a vertical to a horizontal position on a hard surface. The plasticity of the material employed prior to the date of Edison's 1892 patent is set forth, for example, in Edison's patent No. 382,417, heretofore referred to, it being stated in lines 63 and 64 that the material is still slightly plastic at a temperature of 100 degrees Fahrenheit. That such material is very hard and brittle when cold appears from a perusal of Edison's patent No. 406,576, Mr. Edison stating that he has found it better "to employ a material which is hard and brittle" at ordinary temperatures, and states that such preferable material is a metallic soap, such as a stearate of soda.

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The high co-efficient of expansion and contraction of such wax-like materials was very well known at the date of the 1892 patent. In his patent No. 382,462, Mr. Edison stated that compounds composed of wax or other types of hydrocarbon "contract or expand under variations of temperature to a much greater extent than paper, wood, metal and other hard substances," and in his patent No. 393,462, Nov. 27, 1888, he describes a blank made entirely of wax or wax composition, and states (p. 1, ls. 16-19) that:

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"The excessive contraction of the wax in cooling makes it impossible to give such blanks the precise size externally and internally that they should have."

The "excessive contraction of the wax in cool-

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ing" is also referred to in Mr. Edison's patent No. 393,463.

In addition to the patents mentioned above, as disclosing the employment of wax-like compositions, I would also call attention to Mr. Edison's patents No. 400,648, No. 400,649, and No. 400,650, all dated April 2, 1889.

10 From these patents to which I have referred, it will be apparent that at the date of the 1892 split-mold patent of Mr. Edison's, the employment of various wax-like compositions, and particularly
20 metallic soaps and mixtures of saponified stearic acid and ceresin or other tempering wax, was well known; also that such materials were of a hard, brittle nature at ordinary temperatures, but capable of being rendered plastic by the application of heat; and, lastly, that such material possessed a large co-efficient of expansion and contraction, this being
30 so great, in fact, that Mr. Edison himself characterized it as "excessive." This expansion and contraction of waxes and wax-like material was so great, and so well known, that it was taken advantage of to produce a shrinkage in molded materials which had practically no co-efficient of expansion and contraction. For example, when Mr. Edison undertook to make phonogram blanks from asphalt, which, when melted and poured into molds, does not contract in hardening and therefore could not be readily drawn from the mold, he mixed with the asphalt
40 a small percentage of wax, thereby forming a compound "which shrinks slightly in hardening and can therefore be readily removed from the mold" (Edison's patent No. 406,576, p. 1, lines 64-79). It thus appears that by the addition of a very small per cent. of wax to his asphalt he was able to obtain a shrinkage, due entirely to the wax, which shrinkage was sufficient to enable him to readily withdraw the molded blank from the mold. This, I think, is of itself sufficient to demonstrate the fact that it was

obvious to experts in the art with which we are dealing that the "excessive contraction" of wax-like material would enable it (after it had been melted and cast into a mold having a record in relief thereon), to be readily withdrawn from the mold upon cooling.

Adjourned to Mar. 23, 1904, at 10:30 A. M.

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Washington, D. C., March 23, 1904.

Met pursuant to adjournment.

Parties present as before.

Q. 9. What do you understand to be the meaning of the word "phonogram," as employed in the patent in suit? 20

A. As employed in the patent in suit "phonogram" means a record tablet either with or without irregular lines corresponding to sound waves thereon. This word is one which, so far as I am informed, was introduced into the art by Mr. Edison and is not to any very great extent employed by those other than Mr. Edison or individuals closely connected or allied with him. Usually in the art, the word "record" is employed to designate a tablet having a record-groove formed thereon, and the word "blank" is employed to designate a tablet prepared for the reception of a record before the record has been formed thereon. In the patent in suit, however, Mr. Edison employs the word "phonogram" sometimes in the sense of a blank tablet, as, for example, in claim 13, where he speaks of introducing the blank within the previously formed matrix as "introducing the continuous cylindrical phonogram to be reproduced within said matrix or 30 40

mold, in expanding said phonogram into engagement with the record in relief," etc. Here it is perfectly evident that he uses the word "phonogram" in the sense of a blank tablet. In the first two lines of the claim, as well as in the first two lines of claims 8, 9, 10, 11 and 13, among others the word "phonogram" is also used in the sense of a tablet, and in order to convey the idea that said tablet is to be one with a record formed thereon rather than a blank phonogram, Mr. Edison in each of the claims mentioned adds the expression "having a phonographic record thereon," clearly indicating that the word "phonogram" alone was not in his mind sufficient to convey the idea of a tablet with a record formed thereon, as in this case the words "having a phonographic record formed thereon" would be surplusage. In claim 12, instead of using the expression "introducing the cylindrical continuous phonogram to be reproduced within said matrix or mold," as he did in claim 13, Mr. Edison says "inserting the blank to be reproduced within said matrix or mold." This clearly establishes it in my mind that in many cases in the specification the word "phonogram" means a blank tablet. In claims 2 and 3, however, the word "phonogram" in each case where it occurs means a tablet with the record formed thereon. The object of the procedure defined in these claims is to form tablets having record grooves thereon, and in each of claims 2 and 3 this object is referred to as "the method of producing hollow cylindrical phonograms." In the practice of the method Mr. Edison forms a blank tablet exterior to the mold and then introduces it into the mold. He nowhere discloses in the patent in suit the formation of a blank within the mold and hence if, by the expression "forming a hollow cylindrical plastic phonogram within said mold," we were to understand the formation of a blank within the mold, there would be no foundation for the claim in

the disclosure of the specification. If we read the word "phonogram," however, to mean in these claims a tablet with a record formed thereon, we can find a foundation for the expression in the specification because the formation of the record groove upon the blank tablet does take place within the mold and hence I am forced to the conclusion that in claims 2 and 3 the word "phonogram" means a tablet with a record groove formed thereon.

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Not only do the claims in the patent disclose the use of the word "phonogram" in the sense of a blank tablet, but this also occurs repeatedly in the claims of the specification as originally filed, where he refers to two kinds of phonograms, one being a blank phonogram and the other being a phonogram having a phonographic record thereon. It is therefore very clear that the word "phonogram" as employed in the patent in suit sometimes means a blank tablet and sometimes means a tablet with a record thereon.

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Q. 10. The carton of complainant's molded record offered as an exhibit in case 1076 between the same parties involved in this suit is marked "Patented: May 8, 1888, April 2, 1889, November 12, 1889, June 17, 1890, October 10, 1892, February 5, 1901, June 11, 1901, October 1, 1901." Please state, if you can, to what class of articles the first four of the patents mentioned relates?

A. Each of the four patents granted to Edison under the dates named relates to a blank tablet. The patent of May 8, 1888, is the Edison patent No. 382,417; that of April 2, 1889, is the patent No. 400,648; that of November 12, 1889, is the Edison patent No. 414,761, and that of June 17, 1890, is the Edison patent No. 430,274. The claims of all of these patents are specifically limited to "phonogram blanks," and there is nowhere in any one of said patents even a suggestion that they in any way relate to tablets having a record formed thereon.

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Q. 11. What bearing, if any, would the fact that complainant marks its molded records as being made under patents which relate solely to phonogram blanks have upon your interpretation of the patent in suit and of the disclosure found in the patent No. 382,417 to Mr. Edison?

10 A. In my discussion of the Edison patent No. 382,417, I pointed out that the method of procedure disclosed by said patent was the same method, whether it be employed in the manufacture of a phonogram blank, as stated in the patent, or in the manufacture of a record, and this position of mine is amply confirmed by the fact that complainant marks its molded record as being made under a phonogram blank patent, viz., patent No. 382,417. In my opinion the complainant is perfectly justified in marking its molded records as being made under this patent, because in making its molded records
20 it follows the precise steps of the patent No. 382,417. That is, it first forms a blank, as by casting it in the manner shown in Fig. 1 of said patent; it then takes said blank, inserts it in a continuous cylindrical mold, and proceeds to give it the precise form desired while in a plastic condition due to heat, by expanding it outward into intimate contact with the interior surface of the mold by means of a tapering plunger, and, as I have heretofore stated, the tablet must, of necessity, be withdrawn
30 by contracting it through a reduction of temperature and then lifting it out by a direct longitudinal movement. This is an operation in its entirety identical to that defined in claims 2 and 3 of the patent in suit and is in no wise a different operation or method when it is resorted to for the production of a blank from what it is when it is employed for the production of a record.

This marking of the molded records by complainant as being made under patents which are specifically limited to the manufacture of phonogram
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blanks also confirms me in the opinion which I have heretofore expressed to the effect that the invention of the patent in suit is limited to a process wherein a solid body or blank is introduced into the mold in contradistinction to casting a molten material into the mold. Since the article of the four patents named, *i. e.*, a blank, would be employed in one instance where a solid blank is introduced into the mold, but would not be employed in the other instance when molten metal is cast into the mold. 10

The fact that complainant marks its molded records as being made under patents pertaining exclusively to phonogram blanks, also confirms me in my opinion that the manufacture of phonogram blanks and phonogram records are so analogous that anyone skilled in the art would readily apply a method for making a blank to the manufacture of a record.

Q. 12. Please compare defendant's said process with that of claims 2 and 3 of the patent in suit, and state whether defendant's process employs the subject-matter of said claims. Please consider in your answer Mr. F. L. Dyer's views on this subject as given in his deposition? 20

A. Defendant's process consists in coating a wax record with plumbago, electroplating the same, removing the wax record from the electroplate, and backing the electroplate up with a brass shell; casting molten material, consisting mainly of saponified stearic acid tempered with ceresin, into said mold, and then superheating the material and mold, the degree of temperature being raised to a point where the wax-like material becomes perfectly limpid, whereby the material comes into intimate contact with the entire surface of the mold, and then suddenly chilling the mold and the contained material. This chilling of the material produces a contraction of the mold and the material, but by reason of the fact that the co-efficient of expansion of the wax-like material is greatly in excess of that of the 30 40

metal of the mold, the record shrinks away from the interior surface of the mold sufficiently to entirely clear the surfaces of the mold and permit the molded duplicate record to be lifted out of the mold without injury to the same.

10 Both of the claims of the patent in suit are limited by the disclosures in the specification and by the prior art, to the formation of a duplicate record therein by the introduction of a solid blank tablet within the mold and then pressing the surface of the tablet against the mold by expansion due to heat, preferably aided also by the introduction of a tapering mandrel. The heating of the solid blank tablet not only serves to expand the tablet but also serves to render it somewhat more plastic than when at normal temperature, so that when it is pressed against the surface of the mold it more readily takes the impression thereof. According to the method defined in the claims, after the tablet has been thus pressed against the surface of the mold and receives the impression thereof, it is contracted by a reduction of temperature sufficient to cause the record to entirely clear the surfaces of the mold, after which it is withdrawn from the mold by a direct longitudinal movement.

20 The distinguishing characteristic of the method defined in claims 2 and 3 of the patent in suit is the pressing of the solid material against the surface of the mold. This defendant does not do in the manufacture of its records. On the contrary, it casts molten material into the mold, subsequently heating it to a high degree (350 to 375 degrees F.). It will thus be seen that defendant in its process does not employ the step of pressing a solid material into contact with the surface of the mold. In other words, it does not employ that step whereby, according to the specification, the invention of the patent in suit is attempted to be distinguished from the prior art. Defendant does not expand a

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blank into contact with the interior surface of the mold, and this is the essential feature of the alleged invention set forth in the patent in suit, and particularly insisted upon by the applicant during the prosecution of the case in the Patent Office, as being its distinguishing characteristic.

Complying with that portion of your question which requests me to consider Mr. Dyer's views on this subject, as given in his deposition, I would refer to that portion of Mr. Dyer's deposition beginning on page 24 of complainant's record, wherein he compares the method practiced by defendant with that set out in claims 2 and 3 of the patent in suit. Mr. Dyer says:

"In order that a comparison may be made between the process of the patent in suit and that actually carried out by the defendant, I will briefly summarize the points of similarity between the two:

First, in both cases an original or master record which is to be duplicated is first formed by the engraving action of a curved edge cutter actuated directly by the original sounds;

Second, this master record in both processes is then coated with an extremely thin film of conducting material in a finely divided condition.

Third, the master so coated is then in both processes electroplated with copper, and the electroplated master is then enclosed in a suitable jacket so as to complete the matrix or mold;

Fourth, the master is then removed from the matrix or mold, the latter, in complainant's process, having already a coating of gold to prevent oxidization, and in defendant's process being subsequently gold-plated for the same purpose;

Fifth, in both processes, a hollow cylindrical phonogram or duplicate copy of the original record is formed in this mold by causing a

suitable wax-like material in a heated condition to take an impression from the mold, and in both cases when this impression is taken the duplicate is supported internally by a solid metallic core or mandrel;

Sixth, in both processes, the duplicate copy so obtained is permitted to chill until a sufficient radial contraction takes place to separate the engaging surfaces;

10 Seventh, in both processes, the duplicate is directly removed from the mold after the surfaces have cleared sufficiently to permit of such removal."

20 The first four of these alleged points of similarity relate to steps followed in the construction of the matrix or mold, and were all well known and practiced in the art long prior to the date of the patent in suit, with the single possible exception of the application of the gold plate to the interior of the mold, and this is not made a part of the subject-matter of the claims 2 and 3 of the patent in suit. As to the fifth alleged point of similarity, I have already pointed out that in complainant's method a solid blank is pressed against the interior surface of the mold, whereas in the method followed by defendant a molten material is poured into the mold. These two steps are radically different, and the method of claims 2 and 3 of the patent in suit is necessarily limited by the description of the invention contained in the specification and by the prior art, to the formation of the phonogram by the pressing step.

30 As to the sixth and seventh alleged points of similarity, I have heretofore pointed out in my deposition that they were both old and well-known in the art long prior to the date of the patent in suit.

40 Referring to the conceded difference which I have pointed out in connection with the alleged fifth point of similarity, *i. e.*, the difference between the pressing and the casting step, Mr. Dyer states that

this is not of any importance since one is clearly suggestive of the other. With this opinion I cannot agree. The difference is, in my opinion, a very material one. The casting method is simpler, cheaper, and produces a better duplicate. Moreover, if Mr. Dyer's position to the effect that the casting and the pressing step are substantial equivalents be regarded as correct, then there would be no difference between the patent in suit and Mr. Edison's prior patent, No. 667,662, except in scope. The inventions would be the same.

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For the reasons given, I am clearly of the opinion that defendant does not practice the method disclosed in the patent in suit and defined in claims 2 and 3 of said patent, when such claims are construed, as they must be, in the light of the specification and the prior art.

Counsel for defendant offers in evidence printed Patent Office copies of the specifications and drawings of the following U. S. Patents: Edison No. 382,462; Edison No. 393,463; Edison No. 400,648; Edison No. 400,649; Edison No. 400,650; Edison No. 414,761.

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Direct examination closed.

Washington, D. C., March 31, 1904,

10:30 A. M.

Met pursuant to adjournment.

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Parties as before.

Mr. Dyer proceeds with the Cross-Examination of
MR. CAMERON:

Complainant's counsel says that the direct-examination having by consent been taken without his being present, and his right of objection having been reserved, he now objects to the introduction of Edison's patent No. 667,662 as a part of the prior art, on the ground that the same is immaterial and irrelevant.

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x-Q. 13. Do you regard Edison patent No. 667,662 as a part of the prior art?

Objected to as incompetent.

10 A. Edison's patent No. 667,662 was issued prior to the patent in suit and in the prior part of my deposition I have considered the disclosures therein made wherever they seemed pertinent to the questions being discussed without undertaking to determine whether or not in point of law the Courts would hold such patent as, or as not, a part of the prior art.

x-Q. 14. Your deposition appears to be based upon the proposition that patent No. 667,662 is a part of the prior art. Do you wish it to be so taken?

20 A. I am not aware that the statement to the effect that my deposition appears to be based on such proposition is entirely correct. As stated in my last answer, when I referred to Edison's patent No. 667,662, issued prior to the date of the patent in suit, I did so because same appeared to me to be pertinent to the particular point under discussion and my only "wish" in the matter is that the Court shall take such view of the question as to whether or not it is a part of the prior art as to the Court may seem proper. In other words, I have no particular wish as to how the Court shall determine
30 this question, which appears to me to be a question of law, and I have not "based" my deposition upon any assumption one way or the other as to this question.

x-Q. 15. What do you regard as the relation between the patent in suit and Edison's patent No. 667,662?

40 A. No. 667,662 is for a casting process, and the patent in suit is for a process which, in my opinion, necessarily excludes the casting of molten material in a mold and is limited to the expansion of a solid

blank of material to take the impression from the mold. Thus far I should regard them as being for different specific methods of making duplicate records. Complainant's expert, however, has held that the patent in suit, and particularly claims 2 and 3 thereof, are broad enough to include the casting of molten material as well as the expanding of solid material. If this view is correct, then, in my opinion, patent No. 667,662 and the patent in suit are for the same thing or the same invention, the only difference being as to the breadth or scope of the claims defining the invention. 10

x-Q. 16. If complainant's expert is right, the two patents occupy the well-recognized status of broad and specific patents based upon different specific disclosures. Is that correct?

A. No, sir, for if the step of melting and pouring into the mold of molten material is the equivalent of inserting a solid blank and expanding it into the mold, then the two patents are for the same thing. I may add, however, that in my opinion the casting of the molten wax and the expansion of a solid blank are specifically different, and are not equivalent steps. 20

x-Q. 17. Assume that complainant's expert referred to casting as the "equivalent" of expanding, so far as claims 2 and 3 of the patent in suit are concerned, in the sense that Judge BLATCHFORD found the subsequently patented elements of the Lancaster machine the equivalent of the elements of the Morley machine, in *Morley vs. Lancaster*, 129 U. S., 263. Under this assumption cannot you endorse the proposition of my last question? 30

Objected to as immaterial, and as indefinite, there being nothing to indicate what is meant by the sense that Judge BLATCHFORD employed in the decision referred to in question. Defendant's counsel respectfully submits that the witness is not called upon to read and interpret a decision of the Supreme Court. 40

Complainant's counsel replies that the witness qualified as a lawyer and gave a direct deposition, which is a lawyer's rather than an expert's discussion. Witness is not called upon to interpret the decision, but only to make the assumption that complainant's expert used the term "equivalent" as including subsequently patented means to effect the same result.

10 A. I would not undertake to answer this question without reading the decision in *Morley vs. Lancaster*, a decision which I have not perused for several years.

x-Q. 18. Have you ever examined the molded records put out by the complainant?

A. I have seen molded records put out by the complainant, and have examined one or two of such records somewhat carefully, but I have never made an exhaustive examination of any great number of such records.

20 x-Q. 19. Have you read the testimony of Edison, Aylsworth and others in this case, explaining how the complainant's molded records are made at the present time?

A. I have.

x-Q. 20. Complainant's molded record is carried by a cylinder, or is a cylinder, constructed wholly of wax-like material and having the same co-efficient of expansion throughout its mass?

30 A. The record commercially put out by the complainant is one, so far as I have seen such records, composed of a cylinder of wax-like material. I should, without having actually tested the same to ascertain the fact, expect to find that it had the same co-efficient of expansion throughout its mass.

x-Q. 21. Complainant's molded record is also a hollow cylinder having a tapering bore to fit the mandrel of the phonograph?

40 A. It is a hollow cylinder and all of those I have ever placed upon the mandrel of a machine were tapered to fit the mandrel.

x-Q. 22. Have you any doubt as to the fact that complainant's molded record embodies the terms of the claims of Edison patent No. 382,462, referred to in your direct examination?

A. I should presume that it would respond to the terms of all three of the claims of this patent, though I am not informed whether or not the coefficient of expansion is the same throughout its mass.

x-Q. 23. Have you any doubt as to the fact that complainant's molded record embodies the terms of claims of Edison patent No. 382,418, granted May 8, 1888?

A. All of complainant's records that I have become familiar with would respond to the terms of the claims of this patent.

x-Q. 24. The process by which complainant's molded records are made does not respond to the terms of the claims of Edison's patent No. 382,417, even if the words "blank" and "blanks" in those claims were replaced by the words "record" and "records"?

A. I cannot say, since I do not know the particular method employed by complainant in making its records.

x-Q. 25. It appears in the case that the particular method employed by complainant is that of the Miller & Aylsworth patent No. 683,615. Please answer the last question with this understanding?

A. The process described in the Miller & Aylsworth patent is a "dipping" process. That described in the Edison patent No. 382,417 is a "pressing" process. As I understand the Miller & Aylsworth process, it does not respond to the terms of the Edison patent.

x-Q. 26. You understood at the time of giving your direct deposition that complainant's molded records were made in accordance with the specific process described in the Miller & Aylsworth patent

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referred to? I call your attention to answers 33 and 34 of the deposition of W. H. Miller, in this case, given for complainant.

A. I understood that complainant claimed to make its commercial records under the Miller & Aylsworth patent, and I was familiar with that part of Mr. Miller's testimony wherein he says that they did so make it.

10 x-Q. 27. Where did you get the information which enabled you to make the positive statement of your answer to Q. 10 that the patent date of May 8, 1888, which appears on the cartons carrying complainant's molded records, "is the Edison patent No. 382,417"?

20 A. I have in my possession, chronologically arranged, a practically complete set of patents granted in the talking machine art, and by referring to the patents granted on May 8, 1888, I find granted to Edison on that date the patent No. 382,417. There were other patents granted to him upon the same date which were for mechanism in connection with phonographs, and could not therefore be referred to as the patent of May 8, 1888, under which complainant's records are made. I find, however, upon again referring to the patents granted upon that date. viz., May 8, 1888. that there were two other patents granted to Edison upon that date, viz., patent No. 382,418 and 382,462, which might
30 have been referred to under the date of May 8, 1888, found on the carton, and to that extent my statement that the patent No. 382,417 is the one that must have been referred to is an error.

40 x-Q. 28. You have not yet made it clear why in making your selection of patents intended to be referred to by the patent dates marked on the cartons containing complainant's molded record, you selected an Edison patent of May 8, 1888, describing and claiming a process which you *knew* was not employed in the manufacture of complainant's

molded record, and omitted to select two other patents to Edison of the same date, viz., Nos. 382,418 and 382,462, which you *knew* described and claimed inventions embodied in complainant's molded record, one of which patents, viz., No. 382,462, you had before you and referred to in another connection in your direct examination, and the other patent, viz., No. 382,418, immediately follows the patent you did select in your chronologically arranged set?

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A. I must take exception to that part of your question to the effect that I knew or know the process followed by complainant in the manufacture of its records. I might say in passing that I do not know that complainant employs the Miller & Aylsworth process in the manufacture of its commercial records, and, furthermore, I do not believe it does.

The last half of your question I have already attempted to answer. I frankly admit that the Edison patent No. 382,418 would be applicable to complainant's commercial record, and it is quite possible that the same is true of patent No. 382,462, and I also as frankly admit that in selecting patent No. 382,417 as the one referred to under the date of May 8, 1888, on the carton, I was in error and was led into such error by overlooking the two patents No. 382,418 and No. 382,462.

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x-Q. 29. You don't undertake by your testimony in this case to deny the statements of complainant's witnesses familiar with the facts, that the specific process employed by complainant in the manufacture of its molded records is the process of the Miller & Aylsworth patent No. 683,615?

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A. I do not; I only stated my belief.

x-Q. 30. In your answer to Q. 11, you make what appears to be a positive statement that complainant in the manufacture of its molded records uses the process of expanding a blank in the mold, and

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make this statement the basis of an argument unfavorable to the complainant. Is there any testimony in this case supporting your statement?

A. I know of no testimony to the positive fact that in making its records complainant expands a solid blank. That portion of my answer to Q. 11 referred to assumes that complainant's records are made under the patent in suit.

10 x-Q. 31. That is, you assume that complainant in making its molded records used the process specifically described in the patent in suit, viz., expanding a blank in a mold by means of a tapering plunger. Is that right?

A. I assumed that if the complainant made its records in the manner suggested in your question that it would then bring itself under Patent No. 382,417, and would be justified in so marking the record.

20 x-Q. 32. Did you make the same assumption in selecting patent No. 382,417 in your answer to Q. 10?

A. Certainly.

30 x-Q. 33. In other words, notwithstanding that the fact had been established (by testimony of persons knowing the facts) that, in the manufacture of its molded records, the complainant used the Miller & Aylsworth process, you thought that the mentally reserved and unexpressed assumption stated by you in answer to x-Q. 31, warranted you in making the positive statement in answer to Q. 10, that patent No. 382,417 was referred to by complainant in marking its carton with the date May 8, 1888, and the further positive statement in your answer to Q. 11 that complainant was justified in marking its carton with this patent, because in making its molded records it used the process of expanding a blank in a mold by means of a tapering plunger? Is that right?

40 A. In my answers to Qs. 10 and 11, I made no

mental reservation, though I was so far as patent No. 382,417 is concerned assuming that complainant's records are made under the patent in suit.

Recess.

x-Q. 34. You say in substance that the leading thought in the patent in suit, distinguishing it as a departure from Edison's patent No. 484,582, is the "pressing" as distinguished from the "casting" operation in forming the record. Do you not also recognize as an equally important thought in the patent in suit, distinguishing it over Edison's earlier patent, the idea of using a continuous mold, and the removal of the record from the mold by first contracting it radially and then withdrawing it by a direct longitudinal movement?

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A. I do not.

x-Q. 35. I am not now asking you whether you regard these differences as amounting to invention. I appreciate your attitude with respect to that matter. What I want to know is, if you do not recognize the fact that the patent in suit, as a document or in terms, distinguished over the earlier Edison patent, not only with respect to the manner of forming the record, but also in respect of the manner of removing it from the mold.

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A. The 484,582 patent, while it suggests the use of a split mold, does not exclude the use of a continuous mold; and, on the other hand, while the patent in suit describes a continuous mold and does not specifically describe the use of a split mold, it does not exclude the use of a split mold. The 484,582 patent clearly discloses a continuous mold and the only claim thereof which defines the process of making duplicate records is not limited to the employment of a split mold, but can as well be carried out with the continuous mold disclosed in the specification of said patent. And if a duplicate is thus molded in the continuous mold disclosed in said patent, it will be perfectly obvious to anyone

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skilled in the art that the only way in which it could be removed from the mold would be by contracting it radially until it cleared the surfaces of the mold and then withdrawing it by a direct longitudinal movement. I think, therefore, that the radial contraction and direct longitudinal withdrawal of the duplicate from the mold, defined in the patent in suit, is not one of the features which distinguishes it from the earlier Edison patent No. 484,582.

10 x-Q. 36. I am asking about the *terms* of the two patents. Does the earlier Edison patent describe in *terms* the radial shrinking of the record to clear the surfaces and the withdrawal of the record from the mold by a direct longitudinal movement?

20 A. No, it does not, but the radial contraction of wax-like material which, as Mr. Edison states, is "excessive," was so well known to those skilled in this art that it would be perfectly obvious to such skilled operator that, if the record were cast in the continuous mold disclosed in this patent, the direct longitudinal withdrawal of the molded record would be easy.

The answer after the first four words is objected to as irresponsible.

30 x-Q. 37. Now, as a matter of terms, you must of course assent to the proposition that the patent in suit asserts that one of the features of the invention covered by it is the method of removal of the finished duplicate from the mold?

A. It does.

40 x-Q. 38. In interpreting the phrase "forming a hollow cylindrical plastic phonogram within said mold," appearing in claims 2 and 3 of the patent in suit, did you take into consideration the interpretation of these claims given by the Patent Office before the patent issued by declaring an interference with the application of Joyce, describing a "casting" process?

A. I know that there was an interference with an application of Joyce's, but I have never seen this application, and in interpreting the phrase referred to I could not, therefore, base any material part of my interpretation of it upon the alleged disclosure of the Joyce application, and did not do so.

x-Q. 39. I notice in your answer to Q. 3 that you refer to the Miller & Aylsworth No. 683,615. Is your deposition based upon the assumption that that patent is a part of the prior art?

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A. I cannot say that it is "based" upon any such assumption. I merely referred to it in my deposition because it appeared to be pertinent at the particular point, and in connection with the particular subject-matter which I was then discussing.

x-Q. 40. You refer to Edison's patents 484,582 and 667,662 as "prior" patents, and you also refer to the Miller & Aylsworth patent in the same connection; and you reach the conclusion that the patent in suit "appears to be based wholly upon the difference between *casting a molten material* into the mold and introducing therein a *solid blank* which is *expanded* into close contact with the surface of the mold." Is this conclusion based upon the disclosures of these three prior patents?

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A. My conclusion is based upon the disclosure made by the descriptive part of the patent in suit and the position taken by the applicant himself during the prosecution of the case in the Patent Office. In the patent itself it is clearly and specifically pointed out that in carrying out this process applicant does expand a solid blank into contact with the surface of the mold for the purpose of taking an impression therefrom, and no other method of procedure is indicated. Furthermore, in the prosecution of his application in the Patent Office, applicant clearly indicated that his invention was not broad enough to include the use of a

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solid blank which was "displaced" to cause it to take the impression of the mold, specifically contrasting the *expansion* of a solid blank with what he called the "*displacement*" of a solid blank. From the fact that the patent itself discloses nothing but the method of expanding a solid blank, and the further fact that the applicant stated that his "invention" was not broad enough to include, and did not include the formation of a hollow cylindrical plastic phonogram within the mold by another specific process, viz., that of displacement, I was led to the conclusion that the patent in suit was based wholly upon the expansion of a solid blank within the mold as distinguished from the formation of said blank within the mold by any other specific step, and particularly that it distinguished from casting molten material within the mold which is a step further removed from that of expanding a solid blank, than is the step of displacing a solid blank within the mold. Applicant's distinction between "expanding" and "displacing" was a very narrow one, viz., his allegation that in "expanding" the blank acted like an india-rubber band—first stretching outward and then contracting inward, whereas by "displacement" he alleged that the blank was first caused to move bodily outward against the mold and did not thereafter contract as a rubber band would do. This to my mind is a very narrow and technical distinction, but is one upon which the applicant relied to differentiate the invention of the patent in suit from certain patents in the prior art which had been cited against him. The foregoing were the reasons which lead me to my conclusion that the patent in suit was based upon the distinction of expanding the blank, and I relied more upon them than upon any reference to the prior art.

x-Q. 41. Following the conclusion quoted in the last question, you state in your deposition:

"This appears from the description of the invention in which the only departure from previous practice is in the formation of the record by the expansion of a solid blank within the mold."

Do you there refer to the description contained in the patent in suit?

A. I do.

x-Q. 42. In making this statement, did you not overlook the fact that the patent in suit makes the assertion that one of the features of the invention covered by it is the method of removal of the finished duplicate from the mold? I call your attention to your answer to x-Q. 37. 10

A. I did not.

x-Q. 43. But it is not true that the patent in suit describes as the only departure from previous practice the formation of the record by the expansion of a solid blank within the mold? 20

A. The patent in suit refers to several steps which taken together go to make up the method or process pursued by the patentee in forming a duplicate sound-record. The first of these, viz., the obtaining of a mold, while it is one of the steps of the process, admittedly is not a new step. And the contraction and direct longitudinal movement of the duplicate, while not expressly stated in the specification to be an old step, is one which was old in the art and which being addressed to those who are experts in the art, would be readily understood by such experts as being old. I think that a perusal of all that part of the patent which precedes the claims will clearly establish the statement which I made in my answer to Q. 3, that the patent in suit appears to be based wholly upon the difference between casting molten material into the mold and the introducing therein of a solid blank which is expanded into close contact with the surface of the mold. I did not state, and do not state, that this 30 40

is the only step in applicant's process, but I do state that it is perfectly apparent that it is the one step upon which the patentee relied in his efforts to differentiate his invention from the prior art, and such being the case it is *the* step upon which the patent in suit is based.

10 x-Q. 44. Since you admit (x-Q. 37) that the patent in suit asserts in terms that one of the features of the invention covered by it is the method of removal of the finished duplicate from the mold, I thought you might be willing to admit that you were in error in making the statement in answer to Q. 3, which appears by that answer to be one of the foundations of your attitude, viz., that the patent in suit *describes* as the only departure from previous practice the formation of the record by the expansion of a solid blank within the mold. Do you decline to make that admission?

20 A. Your question does not present the statement which I have made in my answer to Q. 3. I stated in that answer that it appears from the description of the invention that the only departure from the previous practice is in the formation of the record by the expansion of a solid blank within the mold. And further along in said answer, in analyzing claim 2 and indicating the four steps of which it is composed, I stated that, in view of the prior art as exemplified by patents in evidence,
30 it is evident that the "method" defined in the claim could be considered a departure from previous methods of molding cylinders of wax-like and other materials, if at all, solely in that part of the method which is defined by the words "forming a hollow cylindrical plastic phonogram within said mold." I further stated that this conclusion was reached by an examination of the specification which points out as the salient feature of the invention, the expansion of a solid blank within the mold. I do not
40 think that my position can be at all misunderstood.

I recognize the fact that the removal of the record by a direct longitudinal movement is described in terms in the specification, as well as other steps involved in the method, but I repeat that the salient step in the method, and the one upon which the invention of the patent in suit seems to be based, is the step of expanding a solid blank within the mold, and I do not think that I was in error in so stating in my answer to Q. 3.

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x-Q. 45. You have repeated in your answer just given, in the second sentence thereof, the statement which I regard as an error. Do you still decline to make the admission asked for by x-Q. 44?

A. I do.

x-Q. 46. Referring to the use of the word "plastic," in claims 2 and 3 of the patent in suit, do you not recognize the fact that that word may refer to the character of the material of which the phonogram is made rather than to the process of forming the phonogram. *i. e.*, that the word "plastic" qualifies the word "phonogram" and not the word "forming"?

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A. The word "plastic" is not used anywhere in the specification of the patent in suit, but as used in claims 2 and 3 thereof I should understand it to mean to modify, or indicate a characteristic of, the material in which or upon which the record groove was to be formed, *i. e.*, that the expression "forming a hollow cylindrical plastic phonogram" when read in the light of the descriptive matter of the specification and of the prior art, means the formation of a record groove upon a body of material which, at the time of its formation, is in a condition to receive an impression from the mold and retain such impression. I should therefore understand the word "plastic" as modifying or defining the kind of material in or upon which the record groove was to be formed. With the record groove formed in or upon the plastic material, we should have a

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plastic phonogram, and to this extent the word "plastic" *might* be considered as modifying the term "phonogram."

x-Q. 47. The word "phonogram" as used in these claims means the completed cylinder carrying the record?

10 A. I think so. Though Mr. Edison is not always perfectly accurate in his use of this word, since he himself sometimes uses the word to indicate a blank cylinder for the reception of the record groove, and in fact did do so in the application as originally filed, which resulted in the patent in suit. Nevertheless, in claims 2 and 3 of the patent in suit, I am inclined to construe the word "phonogram" as meaning solid material having record grooves formed thereon or therein.

20 x-Q. 48. And hence "plastic phonogram" as used in these claims means such a completed cylinder carrying the record made of a plastic material?

30 A. It is very difficult to say with absolute certainty, but I am inclined to agree with complainant's expert. Mr. Dyer, in his opinion that a plastic material means a material "having a quality of receiving and retaining impressions." (Dyer's deposition x-Q. 71). And since the only object in having the material "plastic" would be to have it in condition to receive the record impression from the interior of the mold, I am inclined to the opinion that the term "plastic" as used in these claims refers to the condition of the material at the instant when it receives the impression from the mold. In other words, I understand that the material at such instant must be in condition to receive and retain the impression of the mold without regard to the fact as to whether or not it retains this condition after the operation is completed. x-Q. 49. Do you not think a possible interpretation of "plastic phonogram" as used in these claims, is that it means
40 a phonogram of plastic material, or material capa-

ble of being made plastic by heat, irrespective of the method of forming the phonogram?

A. It is, of course, "possible" to so construe the word "plastic," since it appears that you have already done so. In my judgment, however, this cannot properly be done without doing violence to the whole object of the invention of the patent in suit. There could be no possible object of having a completed sound-record or "phonogram" in a condition capable of receiving and retaining an impression. In fact, the further we can get away from such condition after the record is once formed, the better the record will be. There is, however, a very distinct object in having the material in a plastic condition, *i. e.*, in a condition capable of receiving and retaining an impression, at the time when it is brought in contact with the surface of the mold in practicing the specific invention set out in the patent in suit, and I am therefore led to the conclusion that when the patentee used the term "plastic" he meant a material for the reception of an impression which material was in a condition capable of receiving and retaining the impression of the mold.

x-Q. 50. Perhaps the difference between us is only a matter of words. I might agree with you that plasticity in the completed article is not particularly desirable, and yet believe that the quality of plasticity in the material of the completed article is the quality which permits the material to be softened by heat, even to the form of liquid, so as to practically enable it to take and retain an impression from the mold. Believing this, and seeing that the grammatical form of the words used in claims 2 and 3 requires that "plastic" should be regarded as modifying "phonogram," my view is that "plastic phonogram" means the plastic quality of the material of which the phonogram is made, irrespective of the method of forming the phonogram. Do you

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not recognize this as a reasonable interpretation of the language?

10 A. I do not, since it appears to me that the reasonable interpretation should be one based upon the objects of the inventions disclosed, the use to which the finished article is to be put, and the particular steps employed in the formation of that article. These all point, in my judgment, to that meaning of the word "plastic," which would limit it to a modification of, or definition of, the condition of the material at the time when it is brought into contact with, or impressed against the surface of, the mold, since that is the time when it is of essential importance that the material should be in a condition capable of receiving and retaining an impression.

20 x-Q. 51. In casting a phonograph record from wax-like materials, such as defendant uses, when does the material receive and retain the impression of the mold?

30 A. I should not regard it as strictly correct to say that it received the "impression of the mold at all. The material enters the mold in a molten condition, and upon reduction of temperature it returns to the solid condition, and in such solid condition has an exterior formation responding to that of the pattern on the interior of the mold which, in the instance under consideration, is a sound-record. I should regard the receiving of "the impression of the mold" as the result of bringing the material into contact with the mold by *pressure*, so that in my judgment it is rather a loose use of the word "impression," to apply it to the act of casting a molten material into a mold and allowing it to solidify therein.

40 x-Q. 52. You say that in cooling down from the melted to the solid state in the casting process, the material of course passes through all intermediate degrees of plasticity. While the material is still a

liquid, it could be poured out of the mold and have no form?

A. That is correct.

x-Q. 53. At what stage of the cooling down, and at what degree of plasticity, would the material be given form?

A. In passing from the liquid to a solid state, some material congeals suddenly and others taper off, so to speak, from the liquid through a soft, non-coherent and jelly-like condition, into the more solid condition I should regard the material as reaching a plastic condition only when it reached that degree of solidity which would enable it to maintain its own form after removal from the mold. It would be given form at that state of the cooling down where it became sufficiently solid to receive and retain impressions. As to "what degree of plasticity" this would be, I am unable to say.

x-Q. 54. With such materials as defendant uses in its casting process, the material would be plastic at the time it is given form?

A. At the first instant when it can be said to receive form from the mold, I doubt whether it would be in a condition to retain its form if deprived of the support of the mold, but it certainly would be in a very few moments of time thereafter if the lowering of the temperature and the solidifying of the material continued.

x-Q. 55. When the material passes from the condition of a liquid in which it might be poured out of the mold to such a solid condition that it could not be poured out of the mold, it has become plastic?

A. Perhaps, to a degree, but I can readily conceive that the material might reach a condition where it could not be "poured out of the mold" and yet if the interior core were removed it might gradually flatten down within the mold. In other words,

would not have consistency sufficient to maintain its own form, even though it might not be capable of being poured out of the mold.

x-Q. 56. When the material first reaches the condition where it will retain its form, if deprived of the support of the mold, it is then plastic?

A. Yes, sir.

Adjourned to Friday, April 1st, 1904, at 10 A. M.

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Washington, D. C., April 1st, 1904, 10 A. M.

Met pursuant to adjournment.

Parties as before.

Mr. Dyer continues the Cross-Examination of Mr. CAMERON.

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x-Q. 57. Regarding Edison's patent 382,417, does this patent contain any statement that the blank after being pressed in the highly polished die of speculum metal, is allowed to cool and contract before it is withdrawn?

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A. No, sir. This patent, however, is addressed to those skilled in the art and one skilled in the art would know that the only way in which the blank could be removed from the highly polished die of Fig. 3 after it had been forcibly expanded against the surface of such die, would be by taking advantage of what Mr. Edison calls the "excessive" contraction of the wax-like material upon cooling.

x-Q. 58. Do you think there would be any difficulty in drawing the blank out of the die immediately upon the completion of the pressing operation?

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A. The patent does not state whether the die is employed in a cold or a heated condition, as I now recall, and the assumption is that the temperature of the die is that of the atmosphere, which

would be approximately 70 degrees. The blank is said to be inserted in the die at a temperature of about 100 degrees F., and the necessary result of pressing the blank in the polished die would be to cool the material somewhat, but would not permit it to contract or draw away from the die while the tapering mandrel was in the blank. In my opinion, the blank might be removed from the die very shortly after the tapering mandrel is withdrawn, since the cooling of the blank would require but a very short time to enable its "excessive" contraction to withdraw it from contact with the polished surface of the die.

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x-Q. 59. Did you ever try the experiment described in connection with Fig. 3 of this Edison patent?

A. No, sir.

x-Q. 60. Would you be surprised to learn that with a highly polished die of speculum metal the blank can be immediately withdrawn after pressing and before any material contraction or reduction in temperature takes place?

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A. With a very highly polished die, any reduction in temperature, though small, would be material and would result in some contraction of the blank which would be material. I should certainly not expect that the blank could be removed from the die without any reduction of temperature, or contraction of the blank.

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x-Q. 61. Assume that the highly polished die was given a slight taper; would any reduction of temperature, or contraction, be necessary to enable the blank to be withdrawn?

A. A slight taper to the die would certainly enable the blank to be withdrawn much more easily, and possibly without reduction in temperature.

x-Q. 62. Considering the thing theoretically (since you have not made the actual experiment), would not the giving of the die a slight taper enable

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the blank to be withdrawn without any contraction whatever, in view of the highly polished character of the die?

10 A. Yes; but in that case the product would not be the product which Mr. Edison says in the patent he prefers to use, viz., "a hollow tapering *cylin-*
15 *der.*" If the resulting blank is to be a "cylinder" it cannot be made in a tapering die. It may, how-
ever, have an interior opening which would taper, as would necessarily be the result of employing the tapering plunger G. The die shown in the patent,
20 Fig. 3, is not a tapering die, whereas the Plunger G which is inserted into the blank, is a tapering plunger. By employing this tapering plunger and cylindrical die a blank would be obtained which would perfectly respond to the form that Mr. Edi-
son says he prefers, viz., "a hollow tapering cylin-
25 *der.*" though he also says that the invention is applicable to other forms. The apparatus disclosed in Fig. 3 would give a blank cylindrical on its exterior surface, and having a tapering hollow or interior opening to fit the tapering mandrel found on all standard talking machines using the cylin-
30 drical records. That the blanks do contract, and materially contract, upon cooling to such an extent in fact that though the patent 382,417 was designed to form a blank "accurate in its size" both "exter-
nally and internally," it was found that the blank contracted so much upon cooling that it had to be
35 reamed out after cooling to give it the proper size to fit the tapering mandrel of the Edison phono-
graph. In his patent 414,761, Mr. Edison says, lines 59 to 64,

40 "In the process of molding the blank *while the material cools* it sometimes becomes contracted or warped on its inner surface, so that it does not fit the phonogram-cylinder, and in this case it has to be reamed out to remove the irregularities. This has to be allowed for in making the blanks."

I think this clearly indicates that Mr. Edison found when he made his blanks in accordance with, or by the use of the apparatus shown in, patent 382,417, that, by reason of the contraction of the blank, he did not get that exact size both externally and internally that was necessary, at least the exact internal size that was necessary, and he was forced to make allowance for the contraction and then ream out the blank after it had cooled and contracted.

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x-Q. 63. Is it not a common expedient in casting or molding articles, particularly in metal molds, to give the molds a slight taper so that the articles can be readily "drawn" from the mold?

A. It is.

x-Q. 64. Do you not observe that in patent 382,417 the word "cylindrical" is used somewhat loosely, as in the expressions "tapering cylindrical blanks" (l. 17) and "cylindrical phonogram carrier" (l. 84), the latter being well known to be a tapering form?

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A. The first expression quoted in your question is not an example of a loose use of the word cylindrical, since the blank made in Fig. 3 would be a perfect cylinder exteriorly and would taper interiorly, thereby having a form which Mr. Edison, in common with other experts in the art, has recognized as the ideal form for a recording tablet. In fact, on this same date, viz., May 8, 1888, Mr. Edison took out a patent, 382,462, claim 3 of which is for a "hollow cylinder with a tapering bore," and Fig. 2 of this patent is an exact illustration of the blank shown in position in Fig. 3 of the patent 382,417. I think, therefore, that in speaking of a "tapering cylindrical blank" in line 17 of the last-named patent, Mr. Edison very clearly and properly described a blank which is a hollow cylinder having a tapering bore. The use of the word "cylindrical" in line 84 of patent 382,417, is not strictly accurate,

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but was used in such a relation that it very clearly conveyed the intended meaning.

x-Q. 65. I quote from patent 382,417.

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"A tapering plunger, G, pressed forward by a screw, H, is forced into the bore of the phonogram blank, pressing the blank against the walls of the surrounding die, and giving it the exact shape and size, both externally and internally, that it is desired the blank should have."

Is it not evident from this that the mold and plunger of Fig. 3 are designed to have the exact shape and size of the completed blank, and that no contraction of the blank after the pressing operation is contemplated—a result which would be secured by retaining the blank in position in the die with the plunger within it until the blank reached atmospheric temperature?

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A. It was evidently Mr. Edison's intention, as expressed in the patent, to give the blank its exact size internally and externally "that it is desired the blank should have." Mr. Edison found, however, as set forth in his patent No. 414,761, to which I have referred, that contraction had to be allowed for in making the blank. Moreover, I observe in lines 77 to 80, of patent 382,417. Mr. Edison first removes his plunger from the interior of the blank and then removes the latter from the die, and he then states that the blank "would be ready for use on a phonograph." If the plunger were permitted to remain within the blank until the blank had cooled, the contraction of the blank would be so great as to split the blank. If, however, the plunger were removed before the blank had cooled, its tapering form would enable this to be readily accomplished, and but a few moments of time would be necessary to further cool the blank and thus so contract it as to enable it to be readily removed from the die, and being thus cooled it would be "ready

for use on a phonograph," a condition which would not be practicable if the blank were warm at the time of its removal, since if a warm blank be put upon the cylinder of a phonograph the latter would chill the blank and result in a contraction which would inevitably split the blank. That this splitting of the blank is almost certain to occur when the same is placed upon the tapering cylinder or mandrel in a warm condition, and subsequently allowed to cool, is well known to anyone accustomed to use talking machines employing records made of wax-like material. I have myself, more than once, had records split by placing them upon a tapering mandrel of the machine on a warm evening and neglecting to remove them. The resulting chill of the succeeding night caused such a contraction of the material of the record as to split and destroy it. I think, therefore, that it is evident to anyone skilled in the art that the blank could not have been permitted to cool in the die with the plunger G in position in the blank. One skilled in the art, even if not instructed in Mr. Edison's patent, would readily have understood that the plunger should be removed, and that after a very few moments' cooling at normal temperatures, the blank would then be readily removable from the die by reason of its contraction.

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x-Q. 66. Patent No. 414,761 relates to making phonogram blanks by a casting operation, the blanks being finished by turning and reaming and not by pressing in a polished die as in patent No. 382,417?

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A. Yes, sir. Mr. Edison found that the pressing in the die of 382,417 did not give him the exact external and internal size desired, because of the contraction occurring when the material cooled.

x-Q. 67. Your authority for the statement as to what Mr. Edison found is based upon the language of patent No. 414,761?

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A. My own knowledge of what would occur, based upon practical experiments of my own, would lead me to the conclusion that Mr. Edison must inevitably find that he would not get the external and internal size desired by the process of patent 382,417, and this conclusion is confirmed by what I find in Mr. Edison's patent 414,761.

10 x-Q. 68. The method of finishing phonogram blanks by pressing, instead of by reaming and turning, has not, so far as you know, been practiced commercially?

A. Not so far as I am aware.

x-Q. 69. Regarding the Lioret patent, No. 528,273, do you regard the method of reproducing phonographic cylinders therein specifically described and illustrated as an operative and useful method?

A. I see no reason why it should not be operative as well as useful.

20 x-Q. 70. Did you observe the criticism of the operativeness of this patent contained in the affidavit of Charles N. Wurth, sworn to Aug. 29, 1898, one of the papers in Defendant's Exhibit, File and Contents of the Patent in Suit?

30 A. Yes, sir; and I also observed that the Patent Office held that the same was not regarded as sufficient to enable the Office to determine that the processes set forth in that patent and another English patent, were inoperative. The Patent Office said, in its letter of Sept. 15, 1898, in regard to the Lioret process as set forth in his British patent (which is the same process as described in his U. S. Patent referred to in your question) :

"The said processes must be regarded as operative until their inoperativeness is established."

x-Q. 71. Have you ever attempted to carry out the Lioret process?

40 A. No, sir.

x-Q. 72. Regarding the making of the mold, do you think it would be practically possible to separate the metal deposit from the steel record cylinder, as Lioret describes, without injury to the sound record carried by the deposit?

A. I do.

x-Q. 73. Why?

A. I see no reason why this could not be accomplished. I observe that in his affidavit Mr. Wurth thinks that there would be an "adhesion between the coating and the mold," but this would not occur if the steel cylinder were properly treated before the electro-deposition of the metal was secured. I also observe that Mr. Wurth does not believe that the coating should be expanded by heat so as to separate it from the steel record cylinder "owing to the practically constant co-efficient of expansion of all metals." This would present no difficulty whatever if the operator supplied only sufficient heat to expand the coating, without heating and consequently expanding the steel cylinder. It is a common practice in shrinking one tube of metal upon another of the same metal (as for example in gun making) to heat one tube while the other remains cold, and then place the heated tube over the cold one, after which the heated tube is allowed to cool, when it so contracts that it grips the inner tube very firmly. If we follow the reverse of this operation, and again heat the outer tube while keeping the inner tube cool, the outer tube can readily be so expanded as to remove it from the inner tube.

x-Q. 74. If the electro-deposit was made directly upon the steel record cylinder, would you not expect the deposit to adhere?

A. I understand your question to contemplate the electro-plating of the steel record cylinder without any treatment to prevent the electroplate from adhering thereto. In such case probably the electroplate would adhere to the steel record cylinder,

and for this very reason no one who understood his business would think of electro-plating a steel cylinder without previously treating it so as to permit of the ready separation of the electro-deposit from the cylinder.

10 x-Q. 75. In attempting to expand a celluloid ring into the mold when immersed in water, as described by Lioret and illustrated in Fig. 8 of his patent, would you expect to secure a perfect impression and without imperfections arising from entrapping water in the threads?

20 A. I should expect some water to be entrapped and to result in some imperfections in the record. I should therefore expect to obtain a record, though not as good a one as might be obtained in case the water was excluded from between the surface of the celluloid blank and the mold. My reason for this opinion that water would be entrapped between the blank and the mold is in the fact that experience has taught that when a solid blank of plastic material, such as the wax-like blank, is inserted into a matrix or mold and then expanded within the mold, even air that is between the inner surface of the mold and the outer surface of the blank will become entrapped and produce more or less imperfections in the resulting duplicate record. This would occur, for example, when using the matrix and blank of the patent in suit. Since experience 30 has taught that air will thus become entrapped, I should expect to find that water would be entrapped in the same way.

x-Q. 76. Does not the peculiar form of the Lioret record make it particularly liable to injury from the entrapping of water in expanding the blank in the mold?

40 A. I should think that the particular form of the screw-threads, *i. e.*, the depth thereof, might render the water a little more liable to be entrapped than would be the case if the record were on the

smooth surface of a matrix, though this is not entirely clear, since it is quite probable that the inclined surfaces leading away from the bottom of the V-shaped groove where the record is situated in the matrix, would result in no water being entrapped at the exact point where the record occurs, the water being forced therefrom along the other surfaces where the record does not exist.

x-Q. 77. Regarding the Young English patent No. 1478 of 1894, do you think that Young was mistaken in stating that it was necessary to collapse the thin cylinder *after* it had been cooled, in order to remove it from the mold? 10

A. Would you kindly indicate to me wherein Young makes any such statement?

x-Q. 78. I refer to the last line of page 3 and first line of page 4 of the Young patent.

A. I observe that Young states that he is, after cooling, "enabled, by slightly collapsing this (meaning the duplicate) inwardly, to cleanly and easily remove it from the electro." This is far from stating that it is "necessary" to do this. Moreover, I observe that the patent in suit employs the same material, viz., celluloid, that Young employs, and that this is the only material specifically claimed (see claim 18) in the patent in suit, and if it is necessary for Young to collapse his completed duplicate in order to remove it from the mold, then it would unquestionably be necessary for Mr. Edison to collapse a duplicate made of the same material in order to remove it from the same mold. 20 30

In this connection it might not be inappropriate to call attention to the well-recognized practice in the Patent Office, requiring an applicant to draw all of his claims so that they will read upon a single specific illustration of his invention, and under this practice, since the specific material claimed in claim 18 is celluloid, we are warranted in the assumption that the Patent Office granted claims 2 40

and 3 with celluloid in mind as the material of which the hollow cylindrical plastic phonogram of said claims was to be made.

x-Q. 79. Do you not recognize the fact that different processes may be performed in this art with the same material?

10 A. Certainly, but when the same steps are performed in the same order upon the same material, I do not regard the processes as different processes but as one and the same process.

x-Q. 80. You may assume that when Young said that by collapsing the thin tube he was "enabled" to remove it from the mold, he meant that without such collapsing it could not be so removed? On this assumption as to Young's meaning, do you think he was mistaken about the fact?

20 A. I should have to base my answer entirely upon my knowledge of the art without ever having undertaken to shrink a celluloid blank away from a matrix, but I should expect that if the celluloid blank were partially cooled that it might be necessary to slightly collapse it in order to withdraw it from the mold; and if it were further reduced in temperature I should expect a further contraction such as would enable it to be withdrawn from the mold without collapsing it. So, in my opinion, it would depend entirely upon the degree of cooling.
30 If only slightly cooled collapsing would be necessary, whereas, if further cooled, I do not think it would be.

x-Q. 81. Under this assumption as to Young's meaning, your view would be that Young proposed to remove the thin cylindrical duplicate from the mold by collapsing it before it had cooled sufficiently to permit its removal without collapsing?

40 A. It appears to me that Young, in order to avoid a loss of time incident to waiting for the

material to cool entirely, partially collapsed it after
it had had its temperature somewhat reduced.

Defendant rests.

SHELTON T. CAMERON.

Certificate of Examiner waived.

REEVE LEWIS,

10

Special Examiner.

(L. S.)

Notary Public,
District of Columbia.

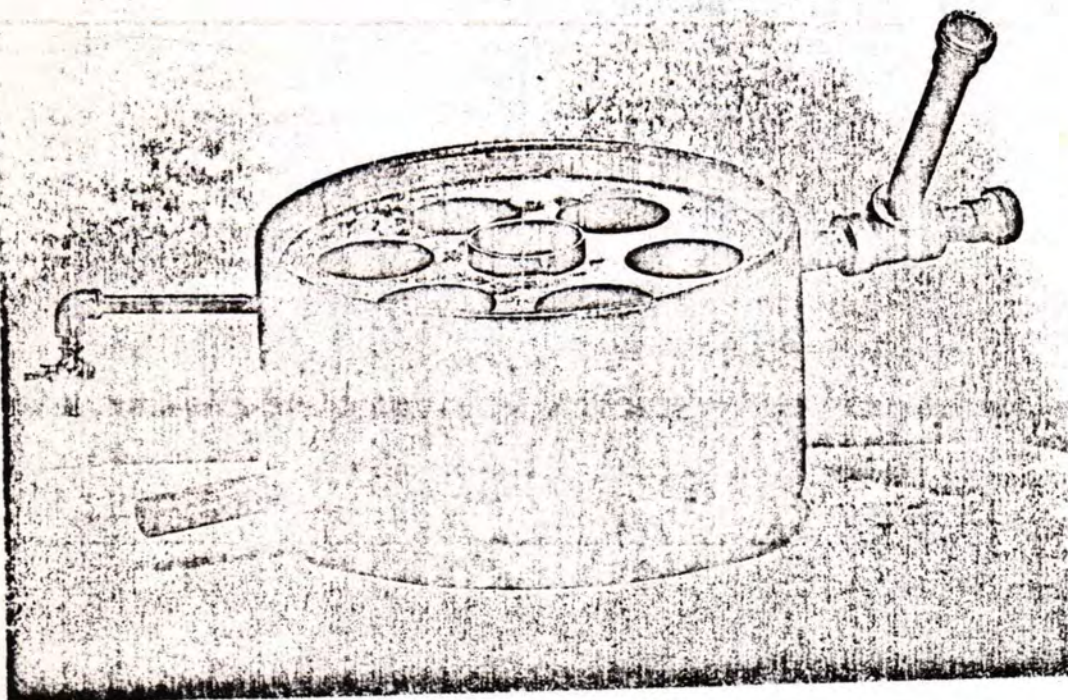
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Exhibits.

**"Defendant's Exhibit Photograph 1895
Mold."**

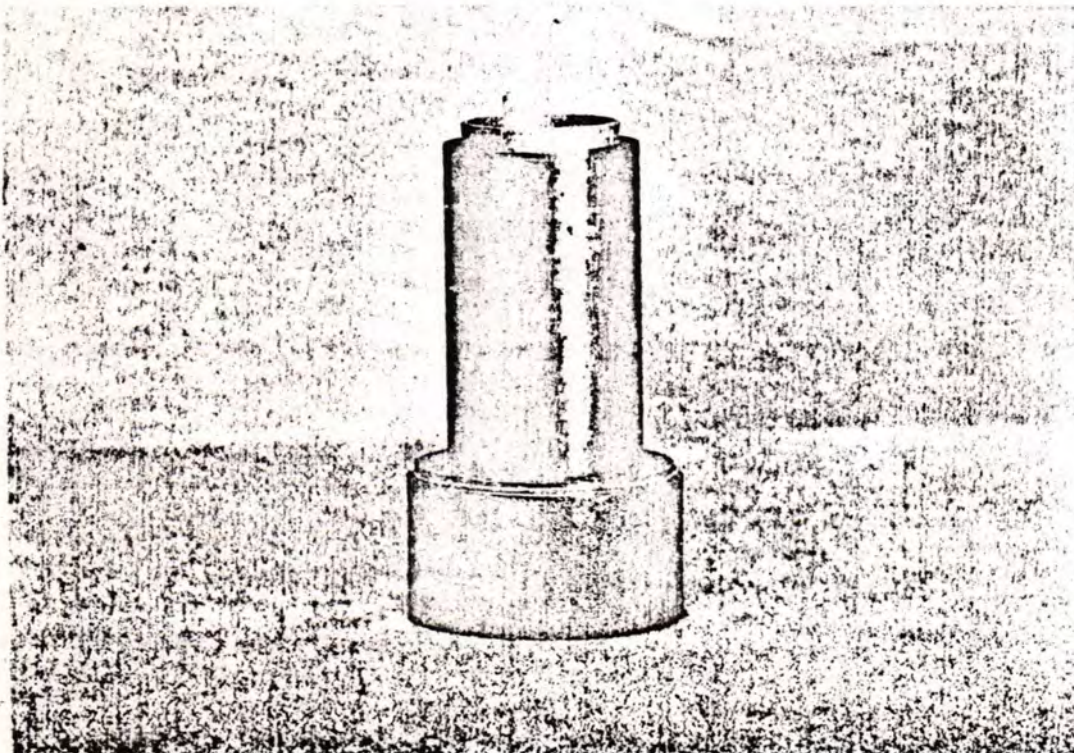


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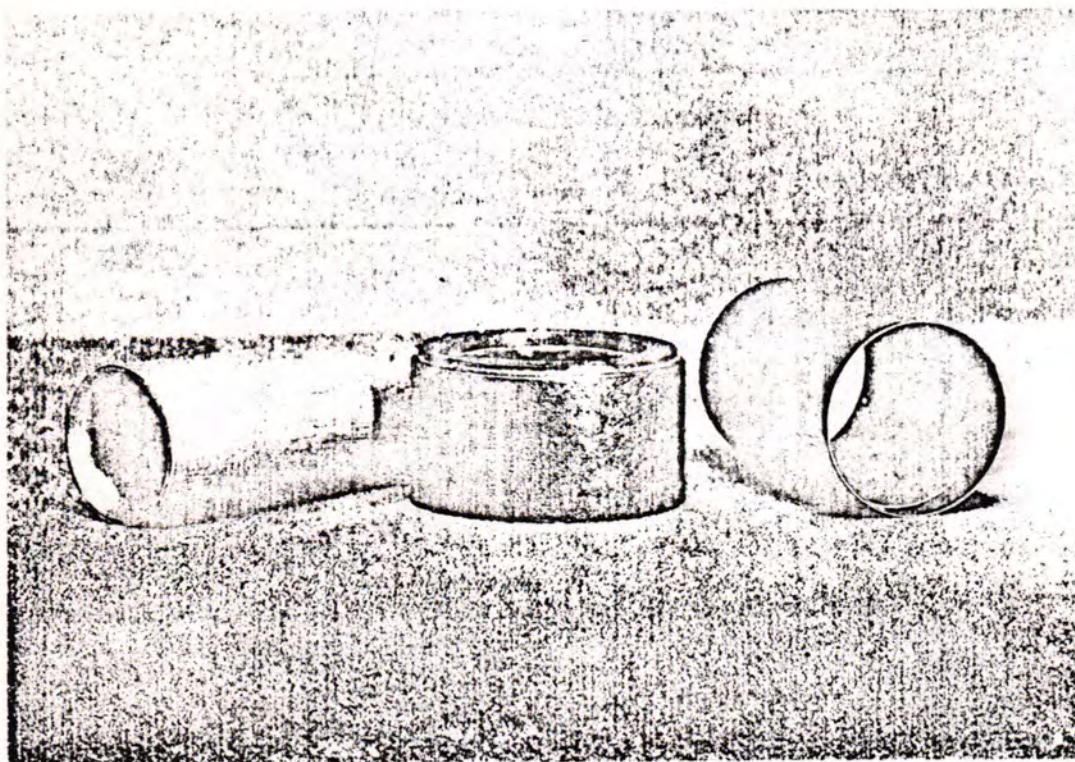
Exhibits.

**"Defendant's Exhibit Photograph 1899
Mold, No. 1."**



Exhibits.

**"Defendants Exhibit Photograph 1899
Mold, No. 2."**



**"Defendant's Exhibit Circular of January,
1902."**

Form 478

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BOSTON, 164 Tremont St.	ST. LOUIS, 720-722 Olive St.
PHILADELPHIA, 1609 Chestnut St.	BUFFALO, 615 Main St.
DETROIT, 238-240 Woodward Ave.	WASHINGTON, 919 Pennsylvania Ave.
LONDON, 122 Oxford St., W.	PARIS, 34 Boulevard des Italiens.
	BERLIN, 65-a Friedrichstrasse.
	MINNEAPOLIS, 306 Nicollet Ave.
	SAN FRANCISCO, 125 Geary St.
	PITTSBURG, 615 Penn Ave.